Last updated: July 20, 2016

Sector: Advanced Manufacturing

COMPUTER-NUMERICALLY CONTROLLED (CNC) OPERATOR (1)

CREDENTIAL

National Institute for Metalworking Skills (NIMS) - Machining Level I CNC Milling Operator. (https://www.nims-skills.org/web/nims/6)

NIMS EXAM

- Available online and is 90 minutes in duration.

AGE & FELONY RESTRICTIONS

- Individuals must be at least 18 years of age to be eligible.
- Individuals with a criminal record can take this training.

LEARNING OUTCOMES – *Individuals must know how to:*

- Safely operate machinery and don personal protective equipment.
- Properly perform Lock-out/Tag-out procedures.
- Understand the importance of compliance of OSHA rules and regulations.
- Comprehend machine operations, material handling, and proper handling and storage of Hazmat materials.
- Properly inspect of parts prior to operation.
- Identify the process of numerical control/computerized numerical control (NC/CNC).
- Identify CNC system components as well as read/interpret CNC prints.
- Utilize media input/output and storage of CNC programs.
- Comprehend manual machine tool practices.
- Manipulate the control systems.
- Correctly control tool movement without damaging equipment using downloaded media.
- Develop an ability to control the components, functions, and operation of tools using the Machine Control Unit (MCU).
- Execute Geometric Dimensioning and Tolerances (GD&T) and inspection methods.
- Perform mathematical computations for CNC Programming.
- Utilize correct programming terminology and apply G machine code.
- Familiar with Computer-Aided Manufacturing (CAM).
    - Apply safety machine shop practices, such as a clean environment and proper oiling of tools.
- Prepare and handle cutting.
    - *Examples*: Proper placement of tools prior to milling operation, safely loading materials, proper adjustments to machine during operation, and ensuring the materials are produced successfully.
- Troubleshoot and correct simple errors as well as perform simple maintenance functions.
    - *Examples*: Replacing tools such as knobs, tapers, and drills.
- Identify preventive measures before performing milling operations.
- Properly use precision inspection equipment to ensure component fabrications are performed correctly by the milling machine.
    - *Examples*: Optical comparators, calipers, and micrometers.
- Operate horizontal and vertical milling machines
    - *Examples*: Parallels, angular milling, rough cut, edge finder, and tolerances.
- Determine the proper setup for a particular job by selecting the appropriate milling machine, measuring instruments, and grinder.
- Compute the proper cutting speeds, sequencing, and feeds.

- Identify the steps involved for troubleshooting an NC/CNC job.
- Explain the procedure for first piece machining as well as internal and external turning operations.
- Explain the steps involved for automatic threading operations and define the process for cutting a taper

Sector: Advanced Manufacturing

COMPUTER-NUMERICALLY CONTROLLED (CNC) OPERATOR (2)

CREDENTIAL
180 Skills Certified CNC Lathe Production Technician

Exams delivered by certification partner SpaceTec. SpaceTec is the National Science Foundation's National Resource Center that promotes and educates candidates for technical employment.

(http://www.credentialtesting.com/180-skills-maker/)

To qualify for the Advanced Manufacturing Technician certification students must have attended an approved training program. No previous work experience is required.

The online assessment consists of 100 questions and lasts two hours. The assessment may be taken at any approved testing center such as Ivy Tech Community College or an approved WorkOne or Adult Education provider.

The cost for the assessment is $35. There are no paper and pencil options.

AGE & FELONY RESTRICTIONS
There are no age restrictions and a felony conviction would not prevent students from taking the certification assessment.

AREAS OF KNOWLEDGE
The material tested includes math, safety, communications, machining, lathe applications, computer-numerically controlled (CNC), cutting, blue print reading, metals, and precision instruments.

LEARNING OUTCOMES – *Individuals must know how to:*

MTH-501 Introduction to Basic Math
- Identify the different branches of mathematics
- Use the calculator
- Understand the importance of estimating an answer before calculating it

MTH-502 Arithmetic Operations
- Name the four basic arithmetic operations
- Identify the symbols for the four basic operations
- Identify the arithmetic comparator symbols
- Define the terminology used with the four basic operations
- Perform math problems using the correct order of operations

MTH-503 Numbers and the Number Line
- Identify place values
- Explain the base ten numbering system
- Identify different types of numbers
- Distinguish a rational number from an irrational number

• Identify the parts of a number line
• Determine the value of hatch marks on a number line
• Define opposite numbers
• Determine a number's absolute value

MTH-504 Decimal Numbers
• Identify place values of decimal numbers
• Understand the power of tens • Determine when to use leading and trailing zeroes
• Add, subtract, multiply, and divide decimals
• Round decimal number

MTH-505 Positive and Negative Numbers
• Understand the difference between a positive and negative number
• Add positive and negative numbers
• Subtract positive and negative numbers
• Multiply positive and negative numbers
• Divide positive and negative numbers

MTH-506 Cartesian Coordinates
• Define the Cartesian coordinate system
• Identify axes
• Define and plot points in the two-dimensional and three-dimensional Cartesian systems
• Plot points in different quadrants

MTH-507 The Metric System
• Describe two systems of measurement
• Identify metric units for length, weight, and volume
• Convert between metric units
• Convert from inches to millimeters
• Convert from millimeters to inches

MTH-508 Introduction to Geometry
• Identify the contribution of Euclid to modern geometry
• Use the calculator
• Look up terms in the glossary

MTH-509 - Basic Building Blocks of Geometry
• Describe points, lines, line segments, rays, and planes
• Define the terms collinear, congruent, and coplanar
• Describe three-dimensional space

MTH-510 - Angles
• Define an angle
• Measure angles using a protractor
• Categorize angles based on their measurements
• Identify angle pairs

MTH-511 - Lines
• Define intersecting and parallel lines
• Define perpendicular and oblique lines

• Describe a transversal
• List the angle pairs created by a transversal

MTH-512 - Polygons
• Define the term polygon
• Describe interior and exterior angles of a polygon
• Define regular and irregular polygons
• Perform calculations on the interior and exterior angles of a polygon

MTH-513 - Triangles
•Classify triangles based on their angles and sides
• Calculate the area of a triangle
• Calculate the lengths of the sides of a right triangle using the Pythagorean Theorem
• Understand the proportions of 30o-60o-90o and 45o-45o-90o right triangles
• Calculate the length of a side or the measure of an angle using trigonometric functions

MTH-514 - Quadrilaterals
• Identify quadrilaterals
• List the properties of quadrilaterals
• Calculate the area of a quadrilaterals

MTH-515 - Circles
• Define a circle
• Define terms related to circles, including radius, chord, and diameter
• Measure arcs
• Define pi
• Calculate the circumference of a circle
• Calculate the length of an arc
• Calculate the area of a circle
• Calculate the area of a sector

MTH-516 - Three-dimensional Shapes
• Define three-dimensional shapes
• Calculate the surface area and volume of a prism
• Calculate the surface area and volume of a cylinder
• Calculate the surface area and volume of a regular pyramid
• Calculate the surface area and volume of a right circular cone
• Calculate the surface area and volume of a sphere

MTH-517- Coordinate Geometry
• Understand a two-dimensional coordinate system
• Calculate the length of a line segment
• Calculate the midpoint of a line segment
• Calculate the slope of a line
• Understand the equation of a line
• Understand the equation of a circle

SAF-509 – Introduction to OSHA
• Describe OSHA's role in workplace safety

- Know who OSHA does and does not cover
- List employee and employer rights under OSHA
- Understand what an OSHA standard is

SAF-510 – Making Work a Safer Place
- Understand the job hazard analysis process
- Know each step of an OSHA inspection
- Identify the different types of citations and penalties
- Know where to find more safety information
- Recognize guidelines for preventing workplace violence
- Spot substance abuse issues

SAF-511 – Help! What to Do in an Emergency
- Develop an emergency action plan
- Know where to find first-aid training
- Control your exposure to blood borne pathogens

SAF-512 – Personal Protective Equipment
- Apply the Hierarchy of Controls
- Understand both employer and employee responsibilities
- Conduct a hazard assessment
- Identify the different types of personal protective equipment

SAF-513 – Eye and Face Protection
- Recognize potential eye and face hazards
- Understand employer responsibilities
- Explain common types of eye and face protection
- Follow guidelines to protect your eyes and face

SAF-515 – Foot and Leg Protection
- Identify types of foot hazards
- Follow guidelines to protect your feet
- Match your shoe protection to the hazard

SAF-516 – Hand and Arm Protection
- Identify types of hand hazards
- Know the guidelines for protecting your hands
- Be familiar with different types of hand

PPE SAF-518 – Hearing Protection
- Recognize the need for hearing protection
- Follow guidelines to reduce the amount of noise exposure
- Choose appropriate hearing PPE
- Know how to use hearing PPE

SAF-520 – Hazardous Materials
- Describe what a hazardous material is and why it's important
- Identify the different forms of toxic materials
- Recognize the entry routes of hazardous materials

SAF-521 – HazCom
- Identify the major changes to the HazCom
- Understand the new label requirements
- Explain each section of the new safety data sheet
- Know what your employer's responsibilities are

SAF-522 – Hazardous Waste
- Define hazardous waste
- Describe the requirements of HAZWOPER
- Explain what an emergency response plan covers

SAF-523 – Work Area Safety
- Understand the importance of housekeeping
- Identify walkways and exits
- Create an ergonomic work environment
- Maintain a correct, neutral posture
- Use proper lifting techniques

SAF-528 – Lockout/Tagout
- Understand the lockout/tagout process
- Identify the main components of an electrical and a pneumatic lockout/tagout
- Follow the steps to perform an electrical lockout/tagout
- Complete a pneumatic lockout/tagout

SAF-537 – Machine Safety
- Describe clothing safety guidelines
- Follow machine operation safety guidelines
- Identify hazardous mechanical motions and actions
- Understand the requirements for safeguards

SOF-506 Interpersonal Communications
- Define communication
- List the three forms of communication
- Identify barriers to communication
- Describe the communication model
- Understand the responsibilities of the sender and receiver
- Understand the importance of feedback
- Identify forms of noise
- Define effective communication
- Understand the consequences of miscommunication
- Match the choice of medium to your message's content
- List the strengths and weaknesses of verbal communication
- Identify when to use verbal communication as the medium for your message
- List the strengths and weaknesses of written communication
- Identify when to use written communication as the medium for your message
- Describe the process for constructing clear verbal and written messages

- Identify the different approaches to communication
- Describe how to communicate effectively face to face
- Understand how paralanguage affects verbal messages
- List ways to engage your listeners
- Describe how to communicate effectively during a phone conversation
- Understand how to leave a clear and effective voicemail
- Describe how to communicate effectively during a conference call
- Understand how to construct a clear written message
- List guidelines for making your message easy to follow
- Describe the guidelines you need to consider when choosing your words
- Identify common grammar mistakes
- List common spelling errors
- Understand the need for editing
- List additional guidelines for writing business letters and memos
- Understand when to use email
- Understand email etiquette
- List guidelines for writing an email
- Describe how a person communicates without words
- Understand how body language sends a message
- Interpret different types of body language
- Describe how spatial distance impacts communication
- List ways to convey openness and acceptance
- Understand the importance of listening
- List the steps in the listening process
- Identify and overcome barriers to listening
- Describe common types of listening
- Describe how to be a good listener
- Describe how to paraphrase and mirror a message
- Understand how to communicate across cultures
- Understand how to communicate across generations
- Describe how to establish rapport
- List ways to communicate effectively in a group
- Describe how to address mistakes and difficult issues
- Understand how to offer a sincere apology
- Describe how to deal with a defensive person

SOF-504 Getting and Keeping a Great Career

- Complete an employment application
- Write a cover letter
- Create a master resume
- Customize a resume to match the job position
- Master the interview process
- Use your appearance and handshake to make a positive impression
- Act professionally during an interview
- Prepare your answers to common interview questions
- Identify illegal questions
- Follow up an interview with a thank-you note
- Respond to a job offer
- Acknowledge the many different roles of others
- Demonstrate desirable character traits

- Understand the importance of a positive attitude
- Respect others
- Recognize the signs of sexual harassment
- Dress for success
- Improve your time management skills
- Keep and maintain a tidy workspace
- Understand the impact of customer service
- Better manage your stress levels

CNC-501 Introduction to Machining
- Identify different classifications of tools
- List methods of removing metal
- List methods of shaping metal
- List common machining operations
- Identify different classifications of machine tools
- List different methods of controlling a machine tool
- List the advantages of manual, automatic, and CNC controlled machine tools
- Identify the major areas of a CNC control
- Understand the history of CNC machine tools
- Identify the major areas of a CNC controller
- Identify common features on a CNC controller
- Identify different classifications of machining personnel
- Identify the duties and requirements of various personnel classifications
- Recognize the available career paths for production CNC operators
- Define facility layout
- Identify different classifications of manufacturing facility layouts
- List the advantages of each facility layout
- Recognize the factors that determine which facility layout is chosen

CNC-502 Introduction to CNC Lathe
- Define a CNC lathe
- List the components of a CNC lathe
- Describe the purpose of each component
- Describe how the axis assemblies move the tool turret
- Define movements on the X-axis and Z-axis
- Describe the machine coordinate system
- Define machine home
- Describe the part coordinate system
- Define part zero
- Describe how ordered pairs are used to define the geometry of a part
- Identify common work holding devices
- Define two options for mounting tools on the tool turret
- Identify the five main areas of the CNC controller
- Describe how the operator controls work
- Describe how the lubrication system works
- Describe how the coolant system works
- Describe how the chip removal system works
- Perform the following basic maintenance tasks
- Check the coolant level
- Check the air pressure

• Check the level of lubricating oil
• Check the level of grease o Check the level of hydraulic oil
• Perform the following basic operational tasks
• Power on the CNC lathe
• Move the axes with the jog handle
• Home the axes
• Select a part program from memory
• Start the part program safely
• Interrupt automatic operations
• Adjust a tool wear offset o Power off the CNC lathe

CNC-503 CNC Lathe Applications
• Perform the following basic maintenance tasks
• Check the coolant level
• Check the air pressure
• Check the level of lubricating oil
• Check the level of grease
• Check the level of hydraulic oil
• Perform the following basic operational tasks
• Power on the CNC lathe
• Move the axes with the jog handle
• Home the axes
• Select a part program from memory
• Start the part program safely
• Interrupt automatic operations
• Adjust a tool wear offset
• Power off the CNC lathe

CNC-506 CNC Lathe Programs
• Define a CNC program
• Define the steps in CNC programming
• Understand the importance of thoroughly planning the creation of a CNC program
• Define program zero
• Distinguish between machine zero and program zero
• List common points used as a program zero
• List methods of creating a CNC program
• Define a stop code
• Define an end of block symbol
• Understand the use of parentheses in a CNC program
• List the two sections of a CNC program
• Distinguish between a block and a word
• Understand the purpose of the program end function
• Define the purpose of G codes
• Define the purpose of S, T, and M words
• Understand the importance of G code groups
• Define the meaning of common G codes
• Define the meaning of common M words
• Understand the numeric value of a T word
• Understand the importance of the format of the numeric data in a word
• Understand the requirements to command a spindle function

- Understand the requirements to command a linear movement
- Understand the requirements to command a circular movement
- List common commands used in each section of the body of a CNC program
- Define a safe start block

CNC-508 CNC Machine Lubricants

- Distinguish between lubricating oils and greases
- Identify advantages of grease over lubricating oil
- Identify ingredients in lubricating oil and grease
- Define viscosity

CUT-509 Cutting Tools for Metalworking

- Define speed and feed
- List common cutting tool materials
- Identify uses of common cutting tool materials
- List the attributes of common cutting tool materials
- Understand the purpose of coatings on cutting tools
- Understand the term carbide grade
- Identify machining operations that can use index able tools
- List the areas of a shank-type index able turning tool holder
- List the components of the insert clamping system
- Identify the meanings of positions in the ANSI and ISO turning tool identification system
- Define the inscribed circle of an insert
- List common shapes of inserts used for turning
- List common shapes of inserts used for milling
- Understand the importance of the tool nose radius
- Understand the ANSI insert identification system
- Define chip breaker
- Identify terms associated with solid cutting tools
- Distinguish between right- and left-hand cutting tools
- Define straight and helical flutes
- Distinguish between right- and left-hand helical flutes
- List the categories of drill lengths
- Understand the size markings of drills
- Understand the markings on taps
- Understand the uses of right- and left-hand helix cutting tools

CUT-504 Threads

- Define pitch
- Define TPI
- Identify the sections of a 60 degree thread form
- List common fastener thread series

CUT-505 Taps

- Identify a hand tap
- Identify a helical tap
- Identify the sections of a tap
- Understand the markings on a tap

CUT-506 Hand Tapping
• List types of tap wrenches
• List proper cutting fluids for tapping different materials
• Understand the process of hand tapping

DWG-501 Blueprint Reading Fundamentals I
• Explain the purpose of blueprints
• List other terms used for blueprints
• Describe methods of creating an engineering drawing
• Explain the purpose and contents of a title block
• Explain the importance of standards for engineering drawings
• List the basic shapes used in engineering drawings
• Identify types of lines shown on engineering drawings
• Identify the angle types seen on engineering drawings
• Explain the relationships that exist between two or more lines
• Explain the relationships that exist between two or more circles
• Explain the relationships between lines, circles, and angles
• Determine the number of views required to define an object
• Explain the difference between isometric and orthographic drawings
• Describe the "glass box" method of illustrating views on an engineering drawing
• Interpret engineering drawings when shown an object
• Explain how views are arranged in a multi-view drawing
• Identify views on an engineering drawing
• Describe the purpose of a sectional view
• Describe the function of cutting planes
• Define how front views are selected
• Identify each type of line used in an engineering drawing
• Describe the function of three line types used in an engineering drawing: visible, hidden, and center
• Describe the function of line precedence
• Identify line types given an engineering drawing
• Interpret hidden features on an engineering drawing
• Interpret views from viewing planes

Blueprint Reading Fundamentals II
• Define a feature
• Define a feature of size
• Describe the function of dimensions and tolerances on an engineering drawing
• Describe, identify, and interpret linear dimensions
• Describe, identify, and interpret dimensions for circular features
• Describe, identify, and interpret dimensions for angular features
• Describe basic rules for dimensioning an engineering drawing
• Describe different features of holes and their symbols
• Define maximum and least material conditions
• List the five geometric characteristic categories
• Identify geometric characteristic symbols

• Define a datum and datum feature
• Describe, identify, and interpret dimensions for angular features
• Identify the sections of a feature control frame
• Describe where datum feature symbols are located on an engineering drawing
• List and describe two methods of displaying an assembly in an engineering drawing
• Interpret an assembly drawing
• Define the types of fits
• Determine the type of fit between two mating parts
• List and describe two methods of displaying an assembly in an engineering drawing
• Interpret an assembly drawing
• Define the types of fits
• Determine the type of fit between two mating parts

MAT-501 Introduction to Metals

• Identify metal products
• Recognize a periodic table and the metals, nonmetals, and metalloids classifications
• Define metals, nonmetals, and metalloids
• Describe and compare the properties of metals, nonmetals, and metalloids
• Explain that metal, nonmetal, and metalloid elements can be combined to form metal alloys
• Explain why machinability is important
• Describe the mechanical properties of metals, including strength, toughness, ductility, malleability, brittleness, and hardness
• Identify and compare methods of testing hardness
• Describe and compare how metal parts are formed and how mechanical properties affect metal forming

MAT-502 Ferrous Metals

• Define ferrous metals
• Compare the composition, properties, and uses of cast, wrought, and pig iron
• Compare the composition, properties, and uses of plain carbon, alloy, stainless, and tool steels
• Identify some of the elements used in iron and steel alloys and the properties they enhance

MAT-503 Nonferrous Metals

• Define nonferrous metals
• Compare the composition, properties, and uses of aluminum, titanium, copper, magnesium, and nickel alloys
• Identify some of the additional alloying elements used in nonferrous metals and the properties they enhance
• Identify common uses of nonferrous metals

MAT-504 Heat Treatment of Metals
• Define heat treatment of metals
• Define quenching
• Describe and compare annealing, normalizing, and tempering
• Compare different methods of hardening metals
• Identify which heat treatment methods can be used on various steels and steel alloys

MEA-501 Introduction to Precision Instruments
- Explain the difference between precision and accuracy
- Identify the resolution of a precision instrument
- Determine the discrimination of a precision instrument
- Identify the basic components of a measurement

MEA-502 Rules
- Identify the key components of the precision rule
- Interpret a rule's graduation lines
- Identify rules based upon their measurement scale
- Choose which type of precision rule to use to measure a length
- Use the precision rule to accurately measure a length

MEA-503 Calipers
- Identify all of the parts of a caliper
- Describe how the parts work together to measure
- Interpret the graduation scales on the caliper
- Zero set your caliper
- Use the caliper to measure a length and depth
- Properly care for your caliper

MEA-504 Micrometers
- Identify the parts of a micrometer
- Describe how the parts work together to measure a product
- Interpret the graduation scales on the standard and Vernier micrometer
- Use the micrometer to accurately measure a distance
- Properly care for your micrometer

MEA-505 Small Hole Gauges
- Identify all of the parts of a small hole gauge
- Describe how the parts work together to measure
- Use the small hole gauge to accurately measure a diameter and width
- Properly care for your small hole gauge

MEA-506 Dial Indicators

- Explain the purpose of a dial indicator
- Differentiate between a balanced and a long-range of dial indicator
- List the major components of a dial indicator
- Explain how to perform a measurement with a dial indicator

MEA-507 Bore Gauges
- Identify the most common types of bore gauges
- Define the characteristics of a precision hole
- Identify and explain the major components of bore gauges
- Demonstrate how to use different types of bore gauges to inspect hole size and hole shape

MEA-508 Height Gauges
- Explain the purpose and function of a height gauge
- Identify the major components of a height gauge
- Define the measurement points of a height gauge measurement
- Use a height gauge to measure a vertical distance

MEA-509 Go/NoGo Gauges

- Identify the different types of Go/NoGo gauges used to inspect holes
- Use a Go/NoGo gauge to inspect hole features

MEA-510 Test Indicators
- Explain the purpose of a test indicator
- Identify and define the major components of a test indicator
- Attach a test indicator to an external device
- Properly align the contact point of a test indicator
- Use a test indicator to perform a comparative measurement

MEA-511 Go/NoGo Thread Gauges

- Identify the different types of threads
- List the components of a thread
- Use Go/NoGo thread gauges to inspect thread form
- List different types of Go/NoGo thread gauges
- Properly care for Go/NoGo thread gauges

MEA-512 Attribute Gauges
- Define the purpose of attribute gauges
- Explain the function and features of attribute gauges
- List the most common types of attribute gauges
- Identify the major components of attribute gauges
- Use an attribute gauge to inspect a product

MEA-513 Thickness and Radius Gauges
- Explain the purpose and function of a thickness gauge
- Identify the major components of a thickness gauge
- Use a thickness gauge to make a comparative measurement
- Explain the purpose and function of a radius gauge
- Identify the major components of a radius gauge

MEA-514 Squares and Protractors
- List the parts of a solid square
- List the parts of a combination square
- Use a solid square to mark perpendicular lines
- Use a center head to find the center of a round part
- Use a combination square to measure and mark lines
- Use a protractor head to mark angular lines

MEA-515 Surface Roughness Gauges

• Identify the characteristics of surface texture
• Identify a surface texture symbol on an engineering drawing
• Identify the components of the surface texture symbol
• Compare the roughness of a surface of a part to a surface roughness comparator

MEA-516 Adjustable Parallels
• List uses of an adjustable parallel
• List the parts of an adjustable parallel
• Use an adjustable parallel and dial caliper to measure the width of a slot

MEA-517 Surface Plates
• Describe a surface plate
• Identify other precision instruments that require a surface plate to measure products
• List product characteristics commonly measured with a surface plate and other precision instruments
• Identify common materials of surface plates
• List the three grades of surface plates
• Understand the quality differences between each grade
• Use best care practices

MEA-518 Optical Comparators
• Describe an optical comparator
• Identify the parts of an optical comparator
• Explain how an optical comparator works
• Understand the field of view
• Know common methods of measuring with an optical comparator
• Properly care for an optical comparator

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COMPUTER-NUMERICALLY CONTROLLED (CNC) OPERATOR (3)

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AGE & FELONY RESTRICTIONS
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AREAS OF KNOWLEDGE
The material covered in the assessment include math, safety, communications, machining, CNC machining center, cutting tools, blue print reading, metals and measurements and gauges, indicators, and optical comparators.

LEARNING OUTCOMES – *Individuals must know how to:*

CNC Machining Center Production Technician

MTH-501 Introduction to Basic Math
- Identify the different branches of mathematics
- Use the calculator
- Understand the importance of estimating an answer before calculating it

MTH-502 Arithmetic Operations
- Name the four basic arithmetic operations
- Identify the symbols for the four basic operations
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• Identify place values
• Explain the base ten numbering system
• Identify different types of numbers
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• Determine the value of hatch marks on a number line
• Define opposite numbers
• Determine a number's absolute value

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• Multiply positive and negative numbers
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• Define the Cartesian coordinate system
• Identify axes
• Define and plot points in the two-dimensional and three-dimensional Cartesian systems • Plot points in different quadrants

MTH-507 the Metric System
• Describe two systems of measurement
• Identify metric units for length, weight, and volume
• Convert between metric units
• Convert from inches to millimeters
• Convert from millimeters to inches

MTH-508 Introduction to Geometry
• Identify the contribution of Euclid to modern geometry
• Use the calculator • Look up terms in the glossary

MTH-509 - Basic Building Blocks of Geometry
• Describe points, lines, line segments, rays, and planes
• Define the terms collinear, congruent, and coplanar
• Describe three-dimensional space

MTH-510 - Angles
• Define an angle
• Measure angles using a protractor
• Categorize angles based on their measurements
• Identify angle pairs

MTH-511 - Lines
• Define intersecting and parallel lines
• Define perpendicular and oblique lines
• Describe a transversal
• List the angle pairs created by a transversal

MTH-512 - Polygons
• Define the term polygon
• Describe interior and exterior angles of a polygon
• Define regular and irregular polygons
• Perform calculations on the interior and exterior angles of a polygon

MTH-513 - Triangles
•Classify triangles based on their angles and sides
• Calculate the area of a triangle
• Calculate the lengths of the sides of a right triangle using the Pythagorean Theorem
• Understand the proportions of 30o-60o-90o and 45o-45o-90o right triangles
• Calculate the length of a side or the measure of an angle using trigonometric functions

MTH-514 - Quadrilaterals
• Identify quadrilaterals
• List the properties of quadrilaterals
• Calculate the area of a quadrilaterals

MTH-515 – Circles
• Define a circle
• Define terms related to circles, including radius, chord, and diameter
• Measure arcs • Define pi
• Calculate the circumference of a circle
• Calculate the length of an arc
• Calculate the area of a circle
• Calculate the area of a sector

MTH-516 - Three-dimensional Shapes
• Define three-dimensional shapes
• Calculate the surface area and volume of a prism
• Calculate the surface area and volume of a cylinder
• Calculate the surface area and volume of a regular pyramid
• Calculate the surface area and volume of a right circular cone
• Calculate the surface area and volume of a sphere

MTH-517- Coordinate Geometry
• Understand a two-dimensional coordinate system
• Calculate the length of a line segment
• Calculate the midpoint of a line segment
• Calculate the slope of a line
• Understand the equation of a line
• Understand the equation of a circle

SAF-509 – Introduction to OSHA
- Describe OSHA's role in workplace safety
- Know who OSHA does and does not cover
- List employee and employer rights under OSHA
- Understand what an OSHA standard is

SAF-510 – Making Work a Safer Place
- Understand the job hazard analysis process
- Know each step of an OSHA inspection
- Identify the different types of citations and penalties
- Know where to find more safety information
- Recognize guidelines for preventing workplace violence
- Spot substance abuse issues

SAF-511 – Help! What to Do in an Emergency
- Develop an emergency action plan
- Know where to find first-aid training
- Control your exposure to blood borne pathogens

SAF-512 – Personal Protective Equipment
- Apply the Hierarchy of Controls
- Understand both employer and employee responsibilities
- Conduct a hazard assessment
- Identify the different types of personal protective equipment

SAF-513 – Eye and Face Protection
- Recognize potential eye and face hazards
- Understand employer responsibilities
- Explain common types of eye and face protection
- Follow guidelines to protect your eyes and face

SAF-515 – Foot and Leg Protection
- Identify types of foot hazards
- Follow guidelines to protect your feet
- Match your shoe protection to the hazard

SAF-516 – Hand and Arm Protection
- Identify types of hand hazards
- Know the guidelines for protecting your hands
- Be familiar with different types of hand

PPE SAF-518 – Hearing Protection
- Recognize the need for hearing protection
- Follow guidelines to reduce the amount of noise exposure
- Choose appropriate hearing PPE
- Know how to use hearing PPE

SAF-520 – Hazardous Materials

• Describe what a hazardous material is and why it's important
• Identify the different forms of toxic materials
• Recognize the entry routes of hazardous materials

SAF-521 – HazCom
• Identify the major changes to the HazCom
• Understand the new label requirements
• Explain each section of the new safety data sheet
• Know what your employer's responsibilities are

SAF-522 – Hazardous Waste
• Define hazardous waste
• Describe the requirements of HAZWOPER
• Explain what an emergency response plan covers

SAF-523 – Work Area Safety
• Understand the importance of housekeeping
• Identify walkways and exits
• Create an ergonomic work environment
• Maintain a correct, neutral posture
• Use proper lifting techniques

SAF-528 – Lockout/Tag-out
• Understand the lockout/tag-out process
• Identify the main components of an electrical and a pneumatic lockout/tag-out
• Follow the steps to perform an electrical lockout/tag-out
• Complete a pneumatic lockout/tag-out

SAF-537 – Machine Safety
• Describe clothing safety guidelines
• Follow machine operation safety guidelines
• Identify hazardous mechanical motions and actions

SOF-506 Interpersonal Communications
• Define communication
• List the three forms of communication
• Identify barriers to communication
• Describe the communication model
• Understand the responsibilities of the sender and receiver
• Understand the importance of feedback
• Identify forms of noise
• Define effective communication
• Understand the consequences of miscommunication
• Match the choice of medium to your message's content
• List the strengths and weaknesses of verbal communication
• Identify when to use verbal communication as the medium for your message
• List the strengths and weaknesses of written communication
• Identify when to use written communication as the medium for your message
• Describe the process for constructing clear verbal and written messages
• Identify the different approaches to communication

- Describe how to communicate effectively face to face
- Understand how paralanguage affects verbal messages
- List ways to engage your listeners
- Describe how to communicate effectively during a phone conversation
- Understand how to leave a clear and effective voicemail
- Describe how to communicate effectively during a conference call
- Understand how to construct a clear written message
- List guidelines for making your message easy to follow
- Describe the guidelines you need to consider when choosing your words
- Identify common grammar mistakes
- List common spelling errors
- Understand the need for editing
- List additional guidelines for writing business letters and memos
- Understand when to use email
- Understand email etiquette
- List guidelines for writing an email
- Describe how a person communicates without words
- Understand how body language sends a message
- Interpret different types of body language
- Describe how spatial distance impacts communication
- List ways to convey openness and acceptance
- Understand the importance of listening
- List the steps in the listening process
- Identify and overcome barriers to listening
- Describe common types of listening
- Describe how to be a good listener
- Describe how to paraphrase and mirror a message
- Understand how to communicate across cultures
- Understand how to communicate across generations
- Describe how to establish rapport
- List ways to communicate effectively in a group
- Describe how to address mistakes and difficult issues
- Understand how to offer a sincere apology
- Describe how to deal with a defensive person

SOF-504 Getting and Keeping a Great Career

- Complete an employment application
- Write a cover letter
- Create a master resume
- Customize a resume to match the job position
- Master the interview process
- Use your appearance and handshake to make a positive impression
- Act professionally during an interview
- Prepare your answers to common interview questions
- Identify illegal questions
- Follow up an interview with a thank-you note
- Respond to a job offer
- Acknowledge the many different roles of others
- Demonstrate desirable character traits
- Understand the importance of a positive attitude

- Respect others
- Recognize the signs of sexual harassment
- Dress for success
- Improve your time management skills
- Keep and maintain a tidy workspace
- Understand the impact of customer service
- Better manage your stress levels

CNC-501 Introduction to Machining
- Identify different classifications of tools
- List methods of removing metal
- List methods of shaping metal
- List common machining operations
- Identify different classifications of machine tools
- List different methods of controlling a machine tool
- List the advantages of manual, automatic, and CNC controlled machine tools
- Identify the major areas of a CNC control
- Understand the history of CNC machine tools
- Identify the major areas of a CNC controller
- Identify common features on a CNC controller
- Identify different classifications of machining personnel
- Identify the duties and requirements of various personnel classifications
- Recognize the available career paths for production CNC operators
- Define facility layout
- Identify different classifications of manufacturing facility layouts
- List the advantages of each facility layout
- Recognize the factors that determine which facility layout is chosen

CNC-504 Introduction to CNC Machining Center
- Define a CNC machining center
- List the components of a CNC machining center
- Describe the purpose of each component
- Describe how the axis assemblies move the spindle head assembly and the table
- Define movements on the X-axis, Y-axis and Z-axis
- Describe the machine coordinate system
- Define machine home
- Describe the part coordinate system
- Define part zero
- Describe how ordered triplets are used to define the geometry of a part
- Identify common work holding devices
- Describe how an automatic tool change occurs
- Identify the five main areas of the CNC controller
- Describe how the operator controls work
- Describe how the lubrication system works
- Describe how the coolant system works
- Describe how the chip removal system works
- Perform the following basic maintenance tasks
- Check the coolant level
- Check the air pressure
- Check the level of lubricating oil

• Check the level of grease
• Perform the following basic operational tasks
• Power on the CNC machining center
• Move the axes with the jog handle
• Home the axes
• Select a part program from memory
• Start the part program safely
• Interrupt automatic operations
• Adjust a tool wear offset
• Power off the machining center

CNC-505 - CNC Machining Center Applications
• Perform the following basic operational tasks
• Power on the CNC machining center
• Move the axes with the jog handle
• Home the axes
• Select a part program from memory
• Start the part program safely
• Interrupt automatic operations
• Adjust a tool wear offset
• Power off the machining center

CNC-507 CNC Machining Center Programs

• Define a CNC program
• Define the steps in CNC programming
• Understand the importance of thoroughly planning the creation of a CNC program
• Define program zero
• Distinguish between machine zero and program zero
• List common points used as a program zero
• List methods of creating a CNC program
• Define a stop code
• Define an end of block symbol
• Understand the use of parentheses in a CNC program
• List the two sections of a CNC program
• Distinguish between a block and a word
• Understand the purpose of the program end function
• Define the purpose of G codes
• Define the purpose of S, T, and M words
• Understand the importance of G code groups
• Define the meaning of common G codes
• Define the meaning of common M words
• Understand the numeric value of a T word
• Understand the importance of the format of the numeric data in a word
• Understand the requirements to command a tool change function
• Understand the requirements to command a spindle function
• Understand the requirements to command a linear movement
• Understand the requirements to command a circular movement
• Understand the requirements for canned cycle commands
• List common commands used in each section of the body of a CNC program

• Define a safe start block

CNC-508 CNC Machine Lubricants
• Distinguish between lubricating oils and greases
• Identify advantages of grease over lubricating oil
• Identify ingredients in lubricating oil and grease
• Define viscosity

CUT-509 Cutting Tools for Metalworking
• Define speed and feed
• List common cutting tool materials
• Identify uses of common cutting tool materials
• List the attributes of common cutting tool materials
• Understand the purpose of coatings on cutting tools
• Understand the term carbide grade
• Identify machining operations that can use index able tools
• List the areas of a shank-type index able turning tool holder
• List the components of the insert clamping system
• Identify the meanings of positions in the ANSI and ISO turning tool identification system
• Define the inscribed circle of an insert
• List common shapes of inserts used for turning
• List common shapes of inserts used for milling
• Understand the importance of the tool nose radius
• Understand the ANSI insert identification system
• Define chip breaker
• Identify terms associated with solid cutting tools
• Distinguish between right- and left-hand cutting tools
• Define straight and helical flutes
• Distinguish between right- and left-hand helical flutes
• List the categories of drill lengths
• Understand the size markings of drills
• Understand the markings on taps
• Understand the uses of right- and left-hand helix cutting tools

CUT-504 Threads
• Define pitch
• Define TPI
• Identify the sections of a 60 degree thread form
• List common fastener thread series

CUT-505 Taps
• Identify a hand tap
• Identify a helical tap
• Identify the sections of a tap
• Understand the markings on a tap

CUT-506 Hand Tapping
• List types of tap wrenches
• List proper cutting fluids for tapping different materials
• Understand the process of hand tapping

DWG-501 Blueprint Reading Fundamentals I

- Explain the purpose of blueprints
- List other terms used for blueprints
- Describe methods of creating an engineering drawing
- Explain the purpose and contents of a title block
- Explain the importance of standards for engineering drawings
- List the basic shapes used in engineering drawings
- Identify types of lines shown on engineering drawings
- Identify the angle types seen on engineering drawings
- Explain the relationships that exist between two or more lines
- Explain the relationships that exist between two or more circles
- Explain the relationships between lines, circles, and angles
- Determine the number of views required to define an object
- Explain the difference between isometric and orthographic drawings
- Describe the "glass box" method of illustrating views on an engineering drawing
- Interpret engineering drawings when shown an object
- Explain how views are arranged in a multi-view drawing
- Identify views on an engineering drawing
- Describe the purpose of a sectional view
- Describe the function of cutting planes
- Define how front views are selected
- Identify each type of line used in an engineering drawing
- Describe the function of three line types used in an engineering drawing: visible, hidden, and center
- Describe the function of line precedence
- Identify line types given an engineering drawing
- Interpret hidden features on an engine

DWG-502 Blueprint Reading Fundamentals II

- Define a feature
- Define a feature of size
- Describe the function of dimensions and tolerances on an engineering drawing
- Describe, identify, and interpret linear dimensions
- Describe, identify, and interpret dimensions for circular features
- Describe, identify, and interpret dimensions for angular features
- Describe basic rules for dimensioning an engineering drawing
- Describe different features of holes and their symbols
- Define maximum and least material conditions
- List the five geometric characteristic categories
- Identify geometric characteristic symbols
- Define a datum and datum feature
- Describe, identify, and interpret dimensions for angular features
- Identify the sections of a feature control frame
- Describe where datum feature symbols are located on an engineering drawing
- List and describe two methods of displaying an assembly in an engineering drawing
- Interpret an assembly drawing
- Define the types of fits
- Determine the type of fit between two mating parts
- List and describe two methods of displaying an assembly in an engineering drawing

• Interpret an assembly drawing
• Define the types of fits
• Determine the type of fit between two mating part

MAT-501 Introduction to Metals
• Identify metal products
• Recognize a periodic table and the metals, nonmetals, and metalloids classifications
• Define metals, nonmetals, and metalloids
• Describe and compare the properties of metals, nonmetals, and metalloids
• Explain that metal, nonmetal, and metalloid elements can be combined to form metal alloys
• Explain why machinability is important
• Describe the mechanical properties of metals, including strength, toughness, ductility, malleability, brittleness, and hardness
• Identify and compare methods of testing hardness
• Describe and compare how metal parts are formed and how mechanical properties affect metal forming

MAT-502 Ferrous Metals
• Define ferrous metals
• Compare the composition, properties, and uses of cast, wrought, and pig iron
• Compare the composition, properties, and uses of plain carbon, alloy, stainless, and tool steels
• Identify some of the elements used in iron and steel alloys and the properties they enhance

MAT-503 Nonferrous Metals
• Define nonferrous metals
• Compare the composition, properties, and uses of aluminum, titanium, copper, magnesium, and nickel alloys
• Identify some of the additional alloying elements used in nonferrous metals and the properties they enhance
• Identify common uses of nonferrous metals

MAT-504 Heat Treatment of Metals
• Define heat treatment of metals
• Define quenching
• Describe and compare annealing, normalizing, and tempering
• Compare different methods of hardening metals
• Identify which heat treatment methods can be used on various steels and steel alloys

MEA-505 Small Hole Gauges
• Identify all of the parts of a small hole gauge
• Describe how the parts work together to measure
• Use the small hole gauge to accurately measure a diameter and width
• Properly care for your small hole gauge

MEA-506 Dial Indicators
• Explain the purpose of a dial indicator
• Differentiate between a balanced and a long-range of dial indicator
• List the major components of a dial indicator
• Explain how to perform a measurement with a dial indicator

MEA-507 Bore Gauges
- Identify the most common types of bore gauges
- Define the characteristics of a precision hole
- Identify and explain the major components of bore gauges
- Demonstrate how to use different types of bore gauges to inspect hole size and hole shape

MEA-508 Height Gauges
- Explain the purpose and function of a height gauge
- Identify the major components of a height gauge
- Define the measurement points of a height gauge measurement
- Use a height gauge to measure a vertical distance

MEA-509 Go/NoGo Gauges
- Identify the different types of Go/NoGo gauges used to inspect holes
- Use a Go/NoGo gauge to inspect hfeatures

MEA-510 Test Indicators
- Explain the purpose of a test indicator
- Identify and define the major components of a test indicator
- Attach a test indicator to an external device
- Properly align the contact point of a test indicator
- Use a test indicator to perform a comparative measurement

MEA-511 Go/NoGo Thread Gauges
- Identify the different types of threads
- List the components of a thread
- Use Go/NoGo thread gauges to inspect thread form
- List different types of Go/NoGo thread gauges
- Properly care for Go/NoGo thread gauges

MEA-512 Attribute Gauges
- Define the purpose of attribute gauges
- Explain the function and features of attribute gauges
- List the most common types of attribute gauges
- Identify the major components of attribute gauges
- Use an attribute gauge to inspect a product

MEA-513 Thickness and Radius Gauges
- Explain the purpose and function of a thickness gauge
- Identify the major components of a thickness gauge
- Use a thickness gauge to make a comparative measurement
- Explain the purpose and function of a radius gauge
- Identify the major components of a radius gauge

MEA-514 Squares and Protractors
- List the parts of a solid square
- List the parts of a combination square
- Use a solid square to mark perpendicular lines

• Use a center head to find the center of a round part
• Use a combination square to measure and mark lines
• Use a protractor head to mark angular lines

MEA-515 Surface Roughness Gauges
• Identify the characteristics of surface texture
• Identify a surface texture symbol on an engineering drawing
• Identify the components of the surface texture symbol
• Compare the roughness of a surface of a part to a surface roughness comparator

MEA-516 Adjustable Parallels
• List uses of an adjustable parallel
• List the parts of an adjustable parallel
• Use an adjustable parallel and dial caliper to measure the width of a slot

MEA-517 Surface Plates
• Describe a surface plate
• Identify other precision instruments that require a surface plate to measure products
• List product characteristics commonly measured with a surface plate and other precision instruments • Identify common materials of surface plates
• List the three grades of surface plates
• Understand the quality differences between each grade
• Use best care practices

MEA-518 Optical Comparators
• Describe an optical comparator
• Identify the parts of an optical comparator
• Explain how an optical comparator works
• Understand the field of view
• Know common methods of measuring with an optical comparator
• Properly care for an optical comparator

Sector: Advanced Manufacturing

ENTRY WELDER

CREDENTIAL

American Welding Society Certificate– Entry Level (AWS) (http://www.aws.org/certification)

- **Partial Completion (required modules):** Module 1, Module 2, Module 3, Module 8 (Units 1 and 3, minimum), and Module 9, as well as one or more of the welding process modules (Module 4, Module 5, Module 6, and Module 7).
- **Full Completion:** Individuals who complete all 9 modules receive a certificate of completion and certification card.

AGE & FELONY RESTRICTIONS

- The suggested minimum age for an individual to enter training is 16.
- Individuals with a criminal record are eligible for this training.

LEARING OUTCOMES

Module 1: Occupational Training – *Individuals must:*

- Possess manual dexterity and eye coordination.
- Possess workplace skills, such as proficiency in math and science.
- Be knowledgeable about metric units, able to complete job cards, and familiar with fitup and assembly of parts.

Module 2: Safety and Health of Welders – *Individuals must know how to:*

- Explain the purpose of safety policies and the necessary steps to take in reporting an accident or emergency.
- Describe first aid procedures, proper tool safety and material handling techniques, and good housekeeping.
- Define the Occupational Safety and Health Act and the Environmental Protection Agency, and the mandatory requirements.
- Identify safety precautions for ladders and scaffolds as well as techniques for storing or handling cylinders.
- Identify fire hazards and define proper extinguishing techniques, as well as how to how to avoid electrical hazard.
- Properly use and inspect equipment used for ventilation as well as identify how to avoid welding fumes.

Module 3: Drawing and Welding Symbol Interpretation– *Individuals must know how to:*

- Interpret basic elements of a drawing or sketch, welding symbol information, and written welding procedures.
- Fabricate parts from a drawing or sketch.

Module 4: Shielded Metal Arc Welding (SMAW) – *Individuals must know how to:*

- Prepare for shielded metal arc welding on carbon steel plate and pipe and properly use shielded metal arc welding equipment.
- Make fillet and groove welds in all positions, on carbon steel plate, and on pipe in the 2F position.

Module 5: Gas Metal Arc Welding (GMAW) – *Individuals must know how to:*

- Prepare for gas metal arc welding operations on carbon steel plate and properly use gas metal arc welding.

- Compose fillet welds, all positions, on carbon steel plate and pipe in 2F position-flat, multiple pass, surfacing welds.
- Make groove welds, all positions, on carbon steel plate with backing and pipe in 1G.
- Construct 1F, 2F, and 1G welds on carbon steel plate.

Module 6: Flux-Cored Arc Welding (FCAW) – *Individuals must know how to:*

- Prepare for flux cored arc welding operations on carbon steel plate and pipe, and operate flux cored arc welding equipment.
- Construct fillet and groove welds in all positions on carbon steel plate.

Module 7: Gas Tungsten Arc Welding (GTAW) – *Individuals must know how to:*

- Prepare for gas tungsten arc welding operations on carbon steel plate, aluminum, and stainless steel plate.
- Function gas tungsten arc welding equipment.
- Construct fillet welds, 2F and 3F positions, on carbon steel plate and make groove welds, 3G position without backing.
- Make 1F-2F welds on aluminum plate, as well as 1G with backing welds on aluminum plate.
- Make 1F-2F-3F welds on stainless steel plate, as well as 1G-2G-3G welds on stainless steel plate.

Module 8: Thermal Cutting Processes (Manual/Mechanized Oxyfuel Cutting (Ofc), Plasma Arc Cutting (PAC) and Air Carbon Cutting (CAC-A) – *Individuals must know how to:*

- Operate manual oxyfuel cutting and manual plasma arc cutting equipment.
- Perform straight cutting, shape cutting, and bevel cutting operations on carbon steel plate and pipe.
- Set up for oxyfuel gas cutting (track burner) operations on carbon steel plate machine and operate equipment.
- Set up for manual plasma arc cutting operations on carbon steel plate, aluminum, and stainless steel plate.
- Set up for manual air carbon arc gouging and cutting operations on carbon steel plate.
- Operate manual air carbon arc cutting equipment and perform metal removal operations on carbon steel plate.

Module 9: Welding Inspection and Testing – *Individuals must know how to:*

- Inspect cut surfaces and edges of prepared base metal parts.
- Tack, intermediate layers, and completed welds

Sector: Advanced Manufacturing

HEATING AND COOLING TECHNICIAN (HVAC)

CREDENTIAL

EPA 608 & Local Municipality Licensure
(http://www.epa.gov/ozone/title6/608/technicians/608certs.html)

- Type I Certification – Can only work on Small Appliance (5lbs or less of refrigerant).
- Type II Certification – Can only work on Medium, High and Very-High Pressure Appliances.
- Type III Certification – Can only work on Low-Pressure Appliances.
- Universal Certification – Anyone that has passed I, II, and III level certifications is automatically given this certification. No additional testing is required for this level.

Each test section has 25 multiple choice questions drawn from a bank of test questions. A passing score of 70%, or 18 out of 25 correct, is required in order to be certified. Each section is graded independently, so a technician could pass Core, Type I and Type III and fail Type II. Core must be passed to receive any certification. All sections must be passed in order to achieve Universal Technician status.

REQUIREMENTS TO TAKE THE EPA 608 EXAM

There are currently no formal requirements to take the EPA 608 exam. However, a student with no formal training or preparation for the exam will not likely be successful.

AGE & FELONY RESTRICTIONS

- Individuals must be at least 18 years of age.
- Individuals with a criminal record are not disqualified from this training.
  - However, there could be significant difficulties with securing employment in this occupation.

LEARNING OUTCOMES – TYPE I (Small Appliances)

Recovery Requirements – *Individuals must know:*

- Definition of "small appliance."
- Evacuation requirements for small appliances with and without working compressors using recovery equipment manufactured before November 15, 1993.
- Evacuation requirements for small appliances with and without working compressors using recovery equipment manufactured after November 15, 1993.

Recovery Techniques – *Individuals must know:*

- Use of pressure and temperature to identify refrigerants and detect non-condensable.
- Methods to recover refrigerant from small appliances with inoperative compressors using a system-dependent or "passive" recovery device (e.g., heat and sharply strike the compressor, use a vacuum pump with non-pressurized recovery container).
- How to install both high and low side access valves when recovering refrigerant from small appliances with inoperative compressors.
- How to operate operative compressors when recovering refrigerant with a system-dependent ("passive") recovery device.
- How to remove solderless access fittings at conclusion of service.
- That R-134a refrigerant is a likely substitute for R-12 in automobiles.

Safety – *Individuals must know how to:*

- Decompose refrigerant products at high temperatures (HCl, HFl etc.).

LEARNING OUTCOMES – TYPE II (High-Pressure)

Leak Detection – *Individuals must know:*

- Signs of leakage in high-pressure systems (excessive superheat, traces of oil for heretic's).
- Need to leak test before charging or recharging equipment.
- Order of preference for leak test gases (nitrogen alone best, but nitrogen with trace quantity of 22 better than pure refrigerant).

Leak Repair Requirements – *Individuals must know:*

- Allowable annual leak rate for commercial and industrial process refrigeration.
- Allowable annual leak rate for other appliances containing more than 50 lbs. of refrigerant.

Recovery Techniques – *Individuals must know:*

- How to recover liquid at beginning of recovery process, speeding up the process.
- Other methods for speeding recovery (chilling recovery vessel, heating appliance or vessel from which refrigerant is being recovered).
- Methods for reducing cross-contamination and emissions when recovery or recycling machine is used with a new refrigerant.
- Need to wait a few minutes after reaching required recovery vacuum to see if system pressure rises (indicating that there is still liquid refrigerant in the system or in the oil).

Recovery Requirements– *Individuals must know:*

- Evacuation requirements for high-pressure appliances in each of the following situations:
  - Disposal.
  - Major vs. non-major repairs.
  - Leaky vs. non-leaky appliances.
  - Appliance (or component) containing less vs. more than 200 lbs.
  - Recovery/recycling equipment built before vs. after November 15, 1993.
- Definition of "major" repairs.
- Prohibition on using system-dependent recovery equipment on systems containing more than 15 pounds of refrigerant.

Refrigeration– *Individuals must know:*

- How to identify refrigerant in appliances.
- Pressure-temperature relationships of common high-pressure refrigerants (may use standard temperature-pressure chart--be aware of need to add 14.7 to translate psig to psia).
- Components of high-pressure appliances (receiver, evaporator, accumulator, etc.) and state of refrigerant (vapor vs. liquid) in them.

Safety– *Individuals must know:*

- Not to energize hermetic compressors under vacuum.
- Equipment room requirements under ASHRAE Standard 15 (oxygen deprivation sensor with all refrigerants).

LEARNING OUTCOMES – TYPE III (Low-pressure)

Leak Detection– *Individuals must know:*

- Order of preference of leak test pressurization methods for low-pressure systems (first: hot water method or built-in system heating/pressurization device such Pre-vac; second: nitrogen).

- Signs of leakage into a low-pressure system (e.g., excessive purging).
- Maximum leak test pressure for low-pressure centrifugal chillers.

Leak Repair Requirements– *Individuals must know:*
- Allowable annual leak rate for commercial and industrial process refrigeration.
- Allowable annual leak rate for other appliances containing more than 50 lbs. of refrigerant.

Recovery Techniques– *Individuals must know:*
- How to recover liquid at beginning of recovery to speed up process.
- Need to recover vapor in addition to liquid.
- Need to heat oil to 130F before removing it to minimize refrigerant release.
- Need to circulate or remove water from chiller during refrigerant evacuation to prevent freezing.
- High-pressure cut-out level of recovery devices used with low-pressure appliances.

Recharging Techniques– *Individuals must know:*
- Need to introduce vapor before liquid to prevent freezing of water in the tubes.
- Need to charge centrifugal through evaporator charging valve.

Recovery Requirements– *Individuals must know:*
- Evacuation requirements for low-pressure appliances in each of the following situations:
  - Disposal.
  - Major vs. non-major repairs.
  - Leaky vs. non-leaky appliances.
  - Appliance (or component) containing less vs. more than 200 lbs.
  - Recovery/recycling equipment built before vs. after November 15, 1993.
- Definitions of "major" and "non-major" repairs.
- Allowable methods for pressurizing a low-pressure system for a non-major repair (controlled hot water and system heating/pressurization device such as Prevac).
- Need to wait a few minutes after reaching required recovery vacuum to see if system pressure rises (indicating that there is still liquid refrigerant in the system or in the oil).

Refrigeration– *Individuals must know:*
- Purpose of purge unit in low-pressure systems.
- Pressure-temperature relationships of low-pressure refrigerants.

Safety– *Individuals must know:*
- Equipment room requirements under ASHRAE Standard 15 (oxygen deprivation sensor with all refrigerants).
- Under ASHRAE Standard 15, need to have equipment room refrigerant sensor for 123.

Sector: Advanced Manufacturing

MACHINE MAINTENANCE TECHNICIAN

CREDENTIAL

The Society For Maintenance And Reliability Professionals – Certified Maintenance and Reliability Technician (http://learn.org/articles/How_Do_I_Become_a_Machine_Repair_Technician.html)

REQUIREMENTS

- There are no work experience or education requirements necessary.
- Criteria to qualify to take the CMRT examination include a commitment to the SMRP Code of Ethics, a completed application, and the application fee.

EXAMINATION

- Available in paper and online and is 3 hours in duration.
- The assessment consists of 175 multi-choice questions and costs $300.00.

AGE & FELONY RESTRICTIONS

- Individuals must be at least 18 years of age to be eligible.
- Individuals with a criminal record (including felony or other crime of moral turpitude) cannot take this certification examination. .

LEARNING OUTCOMES – *Individuals must know how to:*

The CMRT exam tests competency and knowledge of specific tasks within four (4) domains: Maintenance Practices, Preventative and Predictive Maintenance, Troubleshooting and Analysis, and Corrective Maintenance.

Domain I: Maintenance Practices

- Task 1: Adhere to safety, health, and environmental standards and policies by taking personal responsibility in order to prevent injury or illness from exposure to hazards. The candidate must demonstrate knowledge in the following:
  1. Blood borne pathogens
  2. Confined space entry
  3. Electrical safety
  4. Emergency response (ER) and evacuation
  5. Environmental compliance
  6. Ergonomics
  7. Eye protection
  8. Fall protection
  9. Fire safety
  10. HAZCOM/MSDS
  11. Hearing conservation
  12. Ladder Safety
  13. Lockout/tag out procedures
  14. Personal protective equipment (PPEP
  15. Process safety management (PPE)
  16. Respiratory protection
  17. Rigging
  18. Safety system and devices
  19. Scaffolding

- Task 2: Inform production control personnel about the maintenance activity required in accordance with company protocol in order to adjust the operations schedules. The candidate must demonstrate knowledge in the following:
    1. Lockout/tag-out procedures
    2. Process overview
    3. Work permits

- Task 3: Perform the proper lockout/tag-out procedures on equipment in accordance with applicable standards in order to ensure zero energy state prior to commencing maintenance work and minimize health, safety, and environmental hazards to employees and the community. The candidate must demonstrate knowledge in the following:
    1. Lockout/tag-out procedures
    2. Multiple energy sources
    3. Zero energy states

- Task 4: Perform a pre-use inspection on maintenance tools and equipment using established standards and guidelines in order to ensure safe operation and to extend the life of the tools and equipment. The candidate must demonstrate knowledge in the following:
    1. Cranes and hoists
    2. Field machinery and tools
    3. Ladder safety
    4. Rolling stock/mobile equipment (e.g., mobile cranes, man-lift/scissor lift, fork lift)
    5. Shop machinery and tools
    6. Rigging equipment (e.g., slings, shackles, eyebolts, chains, hooks)

- Task 5: Use maintenance tools and equipment in accordance with manufacturers' specifications and established safety policies in order to ensure safety and efficiency. The candidate must demonstrate knowledge in the following:
    1. Equipment and tool specifications
    2. Established equipment and tool-safety policies and procedures

- Task 6: Use measuring tools and equipment in a manner that will ensure accurate measurements in order to perform maintenance tasks properly. The candidate must demonstrate knowledge in the following:
    1. Application of specific tools
    2. Basic math (e.g., fractions, addition, subtraction, multiplication, division)
    3. Calibration requirements for measurement tools (e.g., torque wrench, calipers, and alignment tools)
    4. Conversion of appropriate measurement and engineering units
    5. Measurement principles (e.g., mass, force, motion, distance, acceleration, power, fluid, bulk)
    6. Measurement tools (e.g., rulers, gauges, tapes, micrometer, calipers, lasers)

- Task 7: Handle all maintenance materials and parts in accordance with established standards and procedures in order to prevent damage to the parts and equipment. The candidate must demonstrate knowledge in the following:
    1. Company safety policies
    2. Material handling techniques and procedures
    3. Material storage procedures

4. Original equipment manufacturers' (OEM) instructions

- Task 8: Maintain housekeeping by adhering to established site standards and by removing all maintenance-related parts and waste in order to ensure a safe and orderly job site. The candidate must demonstrate knowledge in the following:
    1. Facility and regulatory policies on housekeeping
    2. Hazards of improper housekeeping
    3. Proper organization and cleaning of job site

- Task 9: Document maintenance activities using the facility's maintenance management system in order to record history, assist with planning and scheduling, and support root-cause failure analysis. The candidate must demonstrate knowledge in the following:
    1. Documentation systems (e.g., paper filing systems, computer filing systems, email)
    2. Maintenance planning and scheduling

Domain II: Preventive and Predictive Maintenance

- Task 1: Perform preventive and/or predictive maintenance according to the work plan in order to maximize mean time between failures. The candidate must demonstrate knowledge in the following:
    1. Company safety, health, and environmental policies
    2. Equipment function and use
    3. Predictive maintenance procedures
    4. Preventive maintenance procedures
    5. Work plan requirements

- Task 2: Apply predictive maintenance techniques by observing equipment performance and collecting ongoing performance data in order to maximize mean time between failures. The candidate must demonstrate knowledge in the following:
    1. Company safety, health, and environmental policies
    2. Function of equipment
    3. Operation parameters for equipment, including baseline conditions
    4. Predictive maintenance techniques and technologies (e.g., oil samples, vibration readings, thermographic equipment, ultrasonic testing)

- Task 3: Lubricate equipment in accordance with the lubrication schedule and equipment specifications in order to ensure reliable performance and prevent damage. The candidate must demonstrate knowledge in the following:
    1. Company safety, health, and environmental policies
    2. Equipment specifications
    3. Filtering systems
    4. Lubricant specifications
    5. Lubricating systems
    6. Lubrication principles
    7. Lubrication route

- Task 4: Perform alignment checks on rotating equipment (e.g., pumps, fans, blowers, turbines, gear boxes, compressors) in accordance with equipment specifications in order to ensure

reliable performance and prevent damage. The candidate must demonstrate knowledge in the following:

1. Company safety, health, and environmental policies
2. Equipment alignment techniques (e.g., laser, reverse, straight edge, rim and face)
3. Equipment functions
4. Thermal growth
5. Operation principles for rotating equipment

Task 5: Perform checks on safety systems and devices in accordance with equipment design specifications in order to ensure reliable operation and protect employees. The candidate must demonstrate knowledge in the following:

1. Company safety, health, and environmental policies
2. Consequences of bypassing safety systems
3. Equipment design specifications
4. Equipment functions (e.g., limit switches, photoelectric eyes)
5. Operation of safety systems

Domain III: Troubleshooting and Analysis

- Task 1: Gather information relating to a maintenance request by reviewing the work order and/or interviewing operations personnel in order to determine the general nature of the problem. The candidate must demonstrate knowledge in the following:
    1. Effective interpersonal relations
    2. Equipment and/or processes
    3. Maintenance work order systems

- Task 2: Verify that the problem is valid by systematically testing and/or observing the equipment's performance, as conditions permit, in order to determine if a problem actually exists. The candidate must demonstrate knowledge in the following:
    1. Function and use of the equipment
    2. Process indicators (e.g., gauges, annunciators, Human Machine Interface [HMI] displays)

- Task 3: Obtain appropriate technical documentation using facility resources in order to gain full understanding of designed operating parameters and/or sequences. The candidate must demonstrate knowledge in the following:
    1. Facility resources (e.g., CMMS, technical library, engineering files)
    2. Operating parameters and sequences
    3. Technical documentation (e.g., schematics, P&ID, blueprints, O&M manuals, SOP, MSDS)

- Task 4: Investigate previous maintenance activities, as conditions require, by reviewing equipment history in order to identify information that will facilitate troubleshooting. The candidate must demonstrate knowledge in the following:
    1. Facility maintenance record systems
    2. Facility preventative maintenance scheduling programs or systems
    3. Preventative maintenance techniques and theories (e.g., lubrication, seals and bearings, alignments)

- Task 5: Identify the cause of the problem using a systematic process of elimination in order to determine what is causing the malfunction. The candidate must demonstrate knowledge in the following:
    1. Equipment and/or process design parameters
    2. Hazards involved with operating and/or maintaining specific process equipment
    3. Systematic troubleshooting and analysis

Domain IV: Corrective Maintenance

- Task 1: Verify troubleshooting analysis by disassembling and inspecting components using established procedures in accordance with applicable standards and guidelines in order to confirm that the identified corrective action is appropriate. The candidate must demonstrate knowledge in the following:
    1. Common mechanical systems (e.g., lubrication, seals and bearings, alignment, power transmission, cams, cranks, pneumatics, hydraulics, thermodynamics, heat transfer, piping systems, steam systems)
    2. Correct use of tools and equipment, including measuring devices
    3. Equipment specifications
    4. Equipment and component functions
    5. Operation of equipment and components
    6. Results of troubleshooting analysis
    7. Specific equipment repair procedures, applicable standards, and guidelines

- Task 2: Repair the malfunction by performing required corrective maintenance tasks in accordance with best maintenance practices in order to return the equipment to the desired operating condition. The candidate must demonstrate knowledge in the following:
    1. Common mechanical systems (e.g., lubrication, seals and bearings, alignment, power transmission, cams, cranks, pneumatics, hydraulics, thermodynamics, heat transfer, piping systems, fabrication, steam systems)
    2. Correct use of tools and equipment, including measuring devices
    3. Equipment specifications
    4. Equipment and component functions (e.g., pumps, fans, blowers, turbines, gear boxes, compressors, fasteners, motors, piping systems, gaskets/packing, drive systems, conveying systems)
    5. Equipment and component operation
    6. Specific equipment repair procedures, applicable standards, and guidelines

- Task 3: Monitor the equipment after it has been repaired while operating it under normal conditions in order to determine whether or not the repair was successful. The candidate must demonstrate knowledge in the following:
    1. Equipment and component functions (e.g., pumps, fans, blowers, turbines, gear boxes, compressors, fasteners, motors, piping systems, gaskets/packing, drive systems, conveying systems)
    2. Equipment and component operation

- Task 4: Release repaired equipment for return to service using standard operating procedures in order to resume normal operations. The candidate must demonstrate knowledge in the following:
    1. Procedures for releasing equipment for return to service

Sector: Advanced Manufacturing

PRODUCTION WORKER (1)

CREDENTIAL

Manufacturing Skills Standards Council (MSSC) - Certified Production Technician (CPT) (http://www.msscusa.org/certification/)

RECOMMENDATIONS

- 9th grade level of math.
- 10th grade level of English.
- Complete the safety course and assessment first.

AGE & FELONY RESTRICTIONS

- The suggested minimum age is 16.
- Individuals with a criminal record are eligible for this training.

THE FIVE PRODUCTION MODULES

Safety, Quality Practices and Measurement, Manufacturing Processes & Production, Maintenance Awareness, and Green Production.

- *Individuals who pass all five Production modules will be fully licensed as a CPT.*

AREAS OF KNOWLEDGE

Fundamental manufacturing principles and practices of Safety and Quality.

- *Examples*: Lock out/tag out, confined space, record keeping, Material Safety Data Sheets (MSDS), hazardous materials, and proper storage of flammable materials, fuel gas, and high pressure gas cylinders.

Quality control concepts and techniques pertaining to manufacturing requirements.

- *Examples*: Basic statistical and probability theory, sampling techniques, process control, attributes and variable charts, and Histograms.

Essential mechanical, electrical, and fluid power principles and practices.

- *Examples*: Machining and tooling, production materials, manufacturing planning, production control, and distribution.

LEARNING OUTCOMES

Safety – Individual must know how to:

a. Maintain a safe and productive workplace
    - Recognize ways in which manufacturing affects the national and global economies
    - Recognize systems of safety used by high-performance manufacturers to produce quality products at lowest possible costs
    - Identify the role of production workers in helping to ensure competitive levels of cost, quality and delivery in a safe work environment
    - Identify external and internal customers
- Perform safety and environmental assessments

- Identify, report and monitor potential hazards in the workplace
- Take corrective action to eliminate potential hazards
- Review health, safety and environmental documentation and policies
- Ensure that inspections meet all relevant health, safety and environmental laws and regulations
- Perform inspections according to company schedule and procedures
- Document inspections
- Store inspection records correctly

b. Perform emergency drills and participate in emergency teams
   - Ensure that training and certification on relevant emergency and first aid procedures are complete and up-to-date
   - Follow company and regulatory procedures for responding to fire and electrical emergencies
   - Ensure that emergency response complies with company and regulatory policies and procedures
   - Document emergency drills and incidents according to company and regulatory procedures
c. Identify unsafe conditions and take corrective action
   - Identify, report and document conditions that present a threat to health, safety and the environment
   - Identify corrective actions
   - Consult appropriate parties about corrective actions
   - Take corrective actions according to company procedures
   - Track and report ongoing safety concerns until corrective action is taken
d. Participate in safety training
   - Follow orientation that covers all topics and procedures needed to facilitate employee safety
   - Follow orientation that identifies needs and processes to raise safety concerns, ask questions and receive additional training
   - Receive orientation on use of personal protective equipment
   - Document orientation according to company requirements
   - Follow safety orientation for relevant laws, policies and regulations
   - Participate in regular safety training
e. Participate in equipment safety training
   - Receive complete orientation to equipment and guidelines for ergonomic safety
   - Communicate all important information regarding equipment safety, including material handling equipment
   - Make suggestions regarding training materials and content to the correct parties
   - Provide evaluations and feedback to improve training materials and methods
   - Ensure trainee has the correct tools to do the job during training
   - Ensure that workers can operate equipment safely through post-training evaluation
   - Ensure that training and facilitation techniques used are appropriate for trainees
   - Document quality and effectiveness of training
f. Suggest processes and procedures that support safety of work environment
   - Consult health and safety representatives in the development of suggestions
   - Provide operator feedback to create a safer, more effective work environment
   - Make suggestions to correct parties, according to company procedure
   - Document suggestions
   - Ensure that content of suggestions responds to safety, quality and productivity issues

g. Fulfill safety and health requirements for maintenance, installation and repair
    - Participate in regular safety communications
    - Participate in job safety analyses regularly according to company policy
    - Follow hazardous materials procedures and policies, such as Safety Data Sheets (SDS) and right-to-know
    - Perform environmental testing of workplace on a regular basis as required by company policy and regulation
    - Audit equipment to ensure there are no by-passes of safety guards
    - Follow all regulatory and company safety procedures, including those related to lock-out/tag-out, confined space and ergonomics
    - Follow good housekeeping procedures

h. Monitor safe equipment and operator performance
    - Perform regular monitoring
    - Report out-of-compliance or unsafe conditions immediately
    - Take corrective action on out-of-compliance or unsafe conditions
    - Check equipment to ensure it is operating according to safety specifications
    - Check tools to ensure they are in compliance with safety specifications
    - Forward accident and injury data to appropriate personnel for inclusion in OSHA recordables
    - Gather information on equipment use from operators to reveal existing or potential safety problems
    - Document all safety monitoring data

i. Utilize effective, safety-enhancing workplace practices
    - Communicate clearly
    - Participate in work teams
    - Make production job assignments
    - Run training programs efficiently

Quality Practices and Measurement – Individual must know how to:

- Participate in periodic or statistically based internal quality audit activities
    - Ensure audit data are relevant and correct
    - Complete all relevant audit forms and forward to proper parties in a timely manner
    - Assess and document conformances to quality standards
    - Include observation of operation in audit to ensure process and product meet specifications, when appropriate
    - Participate in audits in accordance with company and other required schedules and procedures
    - Participate in ongoing audits to optimize the outcomes of corrective actions
- Check and document calibration of gauges and other data collection equipment
    - Follow calibration schedule according to specifications
    - Check instrument certification by reviewing documentation and observing during use
    - Recalibrate instruments out of calibration or refer to appropriate parties for recalibration repairs
- Suggest continuous improvements
    - Recognize potential improvements through observation and data analysis
    - Include measurable and data-driven benefits to the company, customers and employees in suggestions
    - Make suggestions according to proper procedures and documentation
    - Review all relevant data before making suggestions

- Inspect materials and product/process at all stages to ensure they meet specifications
    - Perform sampling and inspection according to schedule and procedures
    - Select and use correct inspection tools and procedures
    - Verify calibration of testing equipment
    - Inspect materials against specifications
    - Identify products, processes and materials that do not meet specifications
    - Verify implementation of corrective actions through spot checks
    - Document and report inspection results to correct parties
- Document the results of quality tests
    - Check data forms to ensure that they are complete and accurate
    - Evaluate and interpret information
    - Forward data to correct parties
    - Select and use correct analytical tools, including statistical process controls (SPC)
    - Store reports for the specified time frames
- Communicate quality problems.
    - Review quality problems with production operators and supervisors
    - Communicate quality problems to appropriate parties
    - Document quality problems according to established processes
    - Summarize and report defect trends to appropriate parties
- Take corrective actions to restore or maintain quality
    - Identify appropriate corrective actions and obtain approvals when needed
    - Make clear, concise, data-supported recommendations for action
    - Make recommendations to the appropriate parties
    - Make adjustments in a timely manner to eliminate deviations and bring process back into control
    - Document adjustments and follow-up product quality checks in correct format
    - Implement corrective action/quality improvements in standardized manner
- Record process outcomes and trends
    - Maintain records on quality process
    - Chart outcomes of quality processes according to appropriate methods and standards
    - Ensure data on quality process performance is accurate
    - Analyze quality process performance data to identify trends
    - Report quality process performance data to appropriate parties in a timely manner
    - Examine previous documentation on similar process issues to identify possible solutions
- Identify fundamentals of blueprint reading
    - Visualize objects in a drawing
    - Identify blueprint features
    - Read and understand dimensions of an object in a technical drawing
    - Recognize functions of sectional drawings
- Use common measurement systems and precision measurement tools
    - Use and convert U.S. measurement and standard international metric systems
    - Measure parts using a machinist's rule and tape measure
    - Measure part dimensions using a caliper and micrometer
    - Measure data from a digital gauge using a computer

Manufacturing Processes and Production – *Individual must know how to:*

- Identify customer needs
    - Recognize the different and common needs of internal and external customers
    - Maintain customer contact about product aspects and printed specifications to ensure understanding of needs
    - Review customer needs on a regular basis
    - Ensure customer specifications are up-to-date
    - Communicate customer needs to others including shift-to-shift, co-workers and managers
    - Address issues preventing customer needs from being met
- Determine resources available for the production process
    - Check raw materials against work orders
    - Check tools and equipment against work orders
    - Communicate discrepancies to the proper parties
    - Ensure that necessary resources are at workstation when required
    - Schedule workers with appropriate skills according to production needs
        - Use advanced technologies to increase productivity
        - Set up and verify equipment for the production process
    - Make proper repairs and adjustments to production equipment prior to putting into service
    - Ensure set-up meets process requirements and product specifications
    - Ensure first piece or production run meets specifications
    - Document set-up procedures to ensure repeatability
    - Ensure set-up meets ergonomic and other relevant health, safety and environmental standards
    - Ensure set up meets equipment specifications
        - Set team production goals
    - Set team goals that are specific, measurable and achievable
    - Align team goals with customer and business needs
    - Ensure team goals focus the team in order to meet team objectives
    - Document team goals and communicate them to all parties
        - Make job assignments
    - Ensure job assignments match skills with the production work to be done
    - Ensure job assignments maximize the use of available skills
    - Ensure business and customer needs are met
    - Ensure workers are notified of job assignments effectively
- Coordinate work flow with team members and other work groups
    - Meet production schedules
    - Notify team members of schedule requirements in a timely way
    - Ensure production workflow runs efficiently
    - Minimize downtime
    - Work with others to facilitate effective workflow
    - Participate in meetings and problem-solving groups
- Communicate production and material requirements and product specifications
    - Ensure communication reflects knowledge of production requirements, levels and product specifications
    - Ensure communication reflects knowledge of material specifications and delivery issues and schedules

    - Ensure communication demonstrates knowledge of customer and business production needs
    - Initiate cross-functionally in a timely and accurate manner to the correct parties
    - Ensure communication is clear and relevant to production and products
    - Track and document communications, as appropriate
- Perform, monitor and document the process to make the product
    - Monitor process control data to ensure that the manufacturing process is meeting product specifications
    - Ensure manufacturing process cycle time meets customer and business needs
    - Ensure product meets customer specifications
    - Label products appropriately for compliance or non-compliance
    - Perform production operations in a manner that fully complies with all health, safety, and environmental policies and practices
- Document product and process compliance with customer requirements
    - Complete documentation of compliance legibly
    - Write documentation of compliance in the appropriate format and store correctly
    - Forward documentation of compliance to the proper parties
    - Complete documentation and obtain "sign off"
    - Label products appropriately for compliance or non-compliance
- Prepare final product for shipping or distribution
    - Ensure packaging materials meet packaging and shipping specifications, including proper labeling and safety requirements
    - Ensure completed documentation of customer packaging and shipping instructions accompany product to next destination
    - Communicate product availability to the proper parties in a timely manner
    - Check product and all relevant information, such as quantity, destination and packaging instruction, against the work order
    - Store or stage product for shipping
    - Follow all laws and regulations with regard to labeling, packaging and transport
    - Follow material handling procedures to prevent product damage

Maintenance Awareness – *Individual must know how to:*

- Perform preventive maintenance and routine repair
    - Monitor preventive maintenance schedule
    - Follow preventive maintenance schedule
    - Document preventive maintenance in a timely manner
    - Communicate repair needs to the correct parties using correct procedures and forms
    - Check any necessary repair work through follow up
    - Ensure necessary supplies are available to perform preventive maintenance
    - Communicate preventive maintenance schedules, documentation, equipment needs and outstanding repairs from shift-to-shift, to team members, to managers and to others as required
    - Follow all safety procedures when performing repairs
- Monitor indicators to ensure correct operations
    - Compare current equipment performance to optimal equipment operations regularly
    - Investigate abnormal equipment conditions
    - Correct abnormal equipment conditions in a timely manner
    - Monitor equipment to ensure that corrective action solved the problem
    - Document equipment repair history

- Perform all housekeeping to maintain production schedule
    - Store tools in proper locations
    - Store materials in a safe manner
    - Identify and promptly report unsafe conditions
    - Take corrective action to address unsafe conditions
    - Ensure workstation is clean and clear of safety hazards
    - Pass scheduled housekeeping inspections
    - Organize workstation to maximize efficiency
- Recognize potential maintenance issues with basic production systems, including knowledge of when to inform maintenance personnel about problems with:
    - Electrical systems
    - Pneumatic systems
    - Hydraulic systems
    - Machine automation systems
    - Lubrication processes
    - Bearings and couplings
    - Belts and chain drives
    - High vacuum systems
    - Laser systems

Green Production – *Individual must know how to:*

- Train workers in environmental issues
    - Include basic characteristics of a "green" manufacturing environment, including new trends and their impact on production workers, the company and society in workforce training
    - Include the benefits of workplace environmental assurance programs to the worker, the company and society in workforce training
    - Participate in environmental training for employees both at time of hire and on a recurrent basis
    - Document required environmental training
    - Participate in environmental training courses regarding the latest technology advancements
    - Incorporate input from instructors and the results of course evaluations into routine updates of environmental training courses
- 2. Implement and promote environmental programs, projects, policies or procedures
    - Document regulatory compliance
    - Ensure company, local, state and federal environmental policies and procedures are communicated and posted as required
    - Identify and report practices inconsistent with established environmental policies and procedures
    - Report violations
    - Ensure materials supporting environmental assurance programs are written consistent with needs of the intended audience
    - Keep environmental assurance materials on file and readily accessible
- 3. Conduct environmental incident and hazard investigations
    - Investigate environmental incidents and hazards, including near misses
    - Document environmental investigation findings
    - Review all environmental investigations and audits and assign corrective actions
    - Check and implement prescribed actions to correct environmental problems

- 4. Conduct preventive environmental inspections
    - Identify, report and document conditions that present a threat to the environment
    - Identify, report and monitor potential environmental hazards in the work area
    - Take corrective action to eliminate potential hazards
    - Gather environmental documentation required from workers is gathered and ensure policies are followed
    - Ensure inspections and audits include all relevant and required environmental laws and regulations
- 5. Monitor environmental aspects at each stage of production
    - Environmental issues involved in production processes are recognized
    - Identify and monitor relevant environmentally significant aspects in the production process for each stage of production to determine whether practical environmental improvements can be made
    - Program equipment to control and monitor the environmental impact of production processes at each stage
- Monitor environmental indicators and gauges according to established procedures and use computers and/or other instruments to inspect and analyze results
    - Monitor consumption and conservation of resources throughout the production process
    - Monitor environmentally impactful agents in the production process are to reduce environmental impact
    - Monitor and evaluate energy use, areas of energy waste and emissions leakage in industrial facilities and production processes
    - Identify and evaluate opportunities for enhancing energy-efficiency and reducing energy-related carbon emissions
- 6. Implement continuous improvement in environmental assurance practices
    - Prioritize and inspect root causes or problems according to established hierarchy
    - Maintain worker knowledge of policies and procedures for environmental issues
    - Participate in meetings with all relevant groups about environmental assurance programs and developments
    - Make suggestions to management for improvement in environmentally-related practices
- 7. Use advanced materials in production to reduce weight and increase life
    - Use designated equipment to monitor, measure and handle advanced materials
    - Take and document measures to ensure cost-effective production line energy efficiency
    - Read and interpret instruments to ensure required controls, including Personal Protective Equipment (PPE)
    - Use environmental controls/levels required for production with advanced materials
    - Adhere to environmental and quality requirements of advanced materials
    - Handle advanced materials, surplus and waste according to established requirements to minimize waste
    - Identify opportunities to reduce materials and volume of waste
- 8. Reprocess materials by recycling and reuse throughout product life cycle to optimize waste reduction
    - Sort waste and used or rejected materials to determine which should go to re-cycling and which can be reused or repurposed inside the company
    - Place waste designated for recycling into prescribed containers
    - Coordinate recycling activities with contractors or other third-party representatives
    - Code and label materials designated for reuse or repurpose

- Assess rejected products to determine whether the product should be repaired, reused or recycled
- Break down rejected products when necessary for reuse, repurpose or recycling

Sector: Advanced Manufacturing

PRODUCTION WORKER (2)

CREDENTIAL

Advanced Manufacturing Production Technician Certificate issued by Purdue Polytechnic

To qualify for the Production Technician Certificate students must earn an average of 70% on series of 10 tests and successfully pass the weight and door simulations at the end of the training program. The type of simulations may be adjusted to meet employer requirements.

RECOMMENDATIONS

- WorkKeys Level 3 in Reading, Locating and Applied Math

AGE & FELONY RESTRICTIONS

- None

EIGHT PRODUCTION MODULES

1. Subaru Manufacturing Way
2. Kaizen Mindset
3. Production Solving – Critical Thinking
4. Manufacturing Workplace Environment
5. Production Simulation (SMW Line Simulation)
6. Fundamental Skills – Assembly Techniques & "Knack" Training
7. Talents
8. Physical Wellness

AREAS OF KNOWLEDGE

The material tested covers blueprints, measurement, teamwork, generational differences, root cause analysis, problem solving, and analytical trouble shooting.

LEARNING OUTCOMES

Advanced Manufacturing Theories (Class)

1. Subaru Manufacturing Way

- **a.** Process repeatability and Safety-Quality-Cost Impact
- **b.** SMW Overview and 5S – Sort, Set in Order, Shine, Standardization, Self-discipline/Sustain
- **c.** Standard Work
- **d.** Job Instruction
- **e.** Process Diagnostics
- **f.** Building in Quality
- **g.** Just-in-Time
- **h.** Continuous Improvement (Kaizen)
- **i.** Standard Work Tools – Process repeatability and Safety-Quality-Cost impact

2. **Kaizen Mindset**
   - **a.** Reduction / Elimination of waste *muda*
   - **b.** Lean Manufacturing – Just in Time (JIT)

3. **Problem Solving – Critical Thinking**
   a. Analytical Trouble Shooting
   b. Creative Problem Solving / Strategic Thinking
   c. Eight Disciplines of Problem Solving *8D
   d. Root Cause Analysis
   e. Safety First – OSHA and Environmental Awareness

4. **Manufacturing Workplace Environment**
   a. Team Work – Team Building
   b. Work Ethics - Professionalism

Advanced Manufacturing Talents (Labs)
Production Simulation (SMW Line Simulation)

1. **Fundamental Skills – Assembly Techniques & "Knack" Training**
   a. Production Environment Orientation & Processing
   b. Inspection, Work cells, Material application, Assembly of parts
   c. Stamping, Body, Paint, Trim, Engine, Quality

2. **Talents**
   b. Understanding Blueprints – Drawings
   c. Mastering Measurement – Tape, Mic, Calipers, Dials-Height-Pin Gages

3. **Physical Wellness**
   a. Conditioning & Injury Prevention – SIA Ramp Up
   b. Dexterity and Agility – Eye/Hand coordination
   c. Flexibility – Stretching routines
   d. Weight – Strengthening
   e. Cardio – Endurance building

Sector: Advanced Manufacturing

PRODUCTION WORKER (3)

CREDENTIAL

180 Skills Certified Advanced Manufacturing Technician

Exams delivered by certification partner SpaceTec. SpaceTec is the National Science Foundation's National Resource Center that promotes and educates candidates for technical employment.

(http://www.credentialtesting.com/180-skills-maker/)

To qualify for the Advanced Manufacturing Technician certification students must have attended an approved training program. No previous work experience is required.

The online assessment consists of 100 questions and lasts two hours. The assessment may be taken at any approved testing center such as Ivy Tech Community College or an approved WorkOne or Adult Education provider.

The cost for the assessment is $35. There are no paper and pencil options.

AGE & FELONY RESTRICTIONS

There are no age restrictions and a felony conviction would not prevent students from taking the certification assessment.

AREAS OF KNOWLEDGE

The material tested covers math, safety, manufacturing teams, communications, manufacturing, engineering processes, logistics, blue print reading, precision instruments, introduction to lean manufacturing, quality systems, statistical process, industrial automation, and introduction to machining.

LEARNING OUTCOMES

Advanced Manufacturing Technician

COMPETENCY

MTH-501 Introduction to Basic Math

- Identify the different branches of mathematics
- Use the calculator
- Understand the importance of estimating an answer before calculating it

MTH-502 Arithmetic Operations

- Name the four basic arithmetic operations
- Identify the symbols for the four basic operations
- Identify the arithmetic comparator symbols
- Define the terminology used with the four basic operations
- Perform math problems using the correct order of operations

MTH-503 Numbers and the Number Line

- Identify place values

- Explain the base ten numbering system
- Identify different types of numbers
- Distinguish a rational number from an irrational number
- Identify the parts of a number line
- Determine the value of hatch marks on a number line
- Define opposite numbers
- Determine a number's absolute value

MTH-504 Decimal Numbers
- Identify place values of decimal numbers
- Understand the power of tens
- Determine when to use leading and trailing zeroes
- Add, subtract, multiply, and divide decimals
- Round decimal numbers

MTH-505 Positive and Negative Numbers
- Understand the difference between a positive and negative number
- Add positive and negative numbers
- Subtract positive and negative numbers
- Multiply positive and negative numbers
- Divide positive and negative numbers

MTH-506 Cartesian Coordinates
- Define the Cartesian coordinate system
- Identify axes
- Define and plot points in the two-dimensional and three-dimensional Cartesian systems
- Plot points in different quadrants

MTH-507 The Metric System
- Describe two systems of measurement
- Identify metric units for length, weight, and volume
- Convert between metric units
- Convert from inches to millimeters
- Convert from millimeters to inches

SAF-509 – Introduction to OSHA
- Describe OSHA's role in workplace safety
- Know who OSHA does and does not cover
- List employee and employer rights under OSHA
- Understand what an OSHA standard is

SAF-510 – Making Work a Safer Place
- Understand the job hazard analysis process
- Know each step of an OSHA inspection
- Identify the different types of citations and penalties
- Know where to find more safety information
- Recognize guidelines for preventing workplace violence
- Spot substance abuse issues

SAF-511 – Help! What to Do in an Emergency
• Develop an emergency action plan
• Know where to find first-aid training
• Control your exposure to blood borne pathogens SAF-512 – Personal Protective Equipment
• Apply the Hierarchy of Controls
• Understand both employer and employee responsibilities
• Conduct a hazard assessment
• Identify the different types of personal protective equipment

SAF-513 – Eye and Face Protection
• Recognize potential eye and face hazards
• Understand employer responsibilities
• Explain common types of eye and face protection
• Follow guidelines to protect your eyes and face

SAF-514 – Head Protection
• Identify types of head hazards
• Know the guidelines to protect your head
• Choose the appropriate hard hat

SAF-515 – Foot and Leg Protection
• Identify types of foot hazards
• Follow guidelines to protect your feet
• Match your shoe protection to the hazard

SAF-516 – Hand and Arm Protection
• Identify types of hand hazards
• Know the guidelines for protecting your hands
• Be familiar with different types of hand PPE

SAF-517 – Body Protection
• Be aware of body hazards
• Identify the types of protective clothing for your body
• Follow safety guidelines for wearing clothing in the workplace

SAF-518 – Hearing Protection
• Recognize the need for hearing protection
• Follow guidelines to reduce the amount of noise exposure
• Choose appropriate hearing PPE
• Know how to use hearing PPE

SAF-519 – Respiratory Protection
• Recognize respiratory hazards
• Identify the different types of respiratory equipment
• Follow the guidelines for respiratory protection

SAF-520 – Hazardous Materials
• Describe what a hazardous material is and why it's important

• Identify the different forms of toxic materials
• Recognize the entry routes of hazardous materials

SAF-521 – HazCom
• Identify the major changes to the HazCom
• Understand the new label requirements
• Explain each section of the new safety data sheet
• Know what your employer's responsibilities are

SAF-522 – Hazardous Waste
• Define hazardous waste
• Describe the requirements of HAZWOPER
• Explain what an emergency response plan covers

SAF-523 – Work Area Safety
• Understand the importance of housekeeping
• Identify walkways and exits
• Create an ergonomic work environment
• Maintain a correct, neutral posture
• Use proper lifting techniques

SAF-525– Fall Prevention
• Know the steps employers must take to prevent falls
• Identify fall protection systems
• Follow safety guidelines for scaffold work
• Stay safe when working on an aerial lift

SAF-527 – Electrical Safety
• Understand how electricity works
• Identify electrical hazards
• Apply electrical safety guidelines

SOF-502 Manufacturing Teams
• Define the term team
• Define the term teamwork
• Describe the seven common elements of teams
• Identify the advantages of teams
• Describe functional teams
• List the aspects of winning teams
• Define team building
• List the purposes of team building
• Identify the purpose of team building activities designed to build team purpose
• Identify the purpose of team building activities designed to improve group dynamics
• List the four common types of team building exercises

SOF-504 Getting and Keeping a Great Career
• Complete an employment application

- Write a cover letter
- Create a master resume
- Customize a resume to match the job position
- Master the interview process
- Use your appearance and handshake to make a positive impression
- Act professionally during an interview
- Prepare your answers to common interview questions
- Identify illegal questions
- Follow up an interview with a thank-you note
- Respond to a job offer
- Acknowledge the many different roles of others
- Demonstrate desirable character traits
- Understand the importance of a positive attitude
- Respect others
- Recognize the signs of sexual harassment
- Dress for success
- Improve your time management skills
- Keep and maintain a tidy workspace
- Understand the impact of customer service
- Better manage your stress levels

SOF-506 Interpersonal Communications

- Define communication
- List the three forms of communication
- Identify barriers to communication
- Describe the communication model
- Understand the responsibilities of the sender and receiver
- Understand the importance of feedback
- Identify forms of noise
- Define effective communication
- Understand the consequences of miscommunication
- Match the choice of medium to your message's content
- List the strengths and weaknesses of verbal communication
- Identify when to use verbal communication as the medium for your message
- List the strengths and weaknesses of written communication
- Identify when to use written communication as the medium for your message
- Describe the process for constructing clear verbal and written messages
- Identify the different approaches to communication
- Describe how to communicate effectively face to face
- Understand how paralanguage affects verbal messages
- List ways to engage your listeners
- Describe how to communicate effectively during a phone conversation
- Understand how to leave a clear and effective voicemail
- Describe how to communicate effectively during a conference call
- Understand how to construct a clear written message
- List guidelines for making your message easy to follow
- Describe the guidelines you need to consider when choosing your words
- Identify common grammar mistakes
- List common spelling errors

• Understand the need for editing
• List additional guidelines for writing business letters and memos
• Understand when to use email
• Understand email etiquette
• List guidelines for writing an email
• Describe how a person communicates without words
• Understand how body language sends a message
• Interpret different types of body language
• Describe how spatial distance impacts communication
• List ways to convey openness and acceptance
• Understand the importance of listening
• List the steps in the listening process
• Identify and overcome barriers to listening
• Describe common types of listening
• Describe how to be a good listener
• Describe how to paraphrase and mirror a message
• Understand how to communicate across cultures
• Understand how to communicate across generations
• Describe how to establish rapport
• List ways to communicate effectively in a group
• Describe how to address mistakes and difficult issues
• Understand how to offer a sincere apology
• Describe how to deal with a defensive person

MFG-501 Manufacturing as a Career
• Describe the current workforce needs in manufacturing and how that number is projected to grow over the next decade.
• Describe how manufacturing outpaces all other industries in salary, benefits, and opportunity for growth.
• Explain the history and evolution of manufacturing in the U.S.
• Describe the varied opportunities and career paths available in manufacturing.
• Explain why companies are choosing to bring manufacturing jobs back to the U.S.
• Define the six major components of production in manufacturing
• Identify and explain the different careers that each of these concentrations can offer
• Explain the benefits of cross training
• Explain the value of getting credentials
• Define STEM
• Identify the various competency levels for employment in manufacturing
• Describe various education and training programs available to job seekers
• Describe twelve major subindustries in manufacturing
• Explain the benefits of networking
• Use the best online job posting sites for manufacturing
• Find manufacturing job descriptions
• Find salary and job growth information

MFG-503 Manufacturing 101
• Define advanced manufacturing
• Identify things you use in your life that are manufactured
• List the top manufacturing industries in the United States

• Explain events that influenced manufacturing throughout history
• List software technologies designed to help in the manufacturing process
• List manufacturing hardware that is used in modern advanced manufacturing
• Describe how connectivity on the macro and micro levels affects advanced manufacturing
• Describe how manufacturing helps transform ideas into products
• Identify different manufacturing roles and how they play a part in product development
• Identify ways technology can help in the product development process
• Describe the process for planning an advanced manufacturing facility
• Identify different advanced manufacturing teams and their questions and concerns in creating a new facility
• Recognize the next steps after the plan has been finalized
• Describe the importance of safety and safety education in manufacturing
• Define "quality" as it relates to manufacturing
• Describe and define "green manufacturing"
• List the main elements that can help a manufacturing company "win"
• Understand how costs—including target cost and cost of production—help determine an advanced manufacturing company's success
• Use math to determine the efficiency and productivity of a manufacturing cycle or equipment
• Explain how delivery, safety, environment and customers influence success
• Identify teams that work together in the advanced manufacturing world
• Articulate the overall mission of a team
• Describe various roles and responsibilities within advanced manufacturing teams
• Describe how teams and individuals work together to manufacture quality products

MFG-502 Engineering Processes
• List the phases in the engineering process
• Understand the function of each stage in the engineering process
• Describe why it is important to share information
• Understand why electronic information sharing systems are used
• Describe the different types of information stored electronically

LOG-501 Logistics 101
• Define logistics
• Identify key accomplishments in the history of logistics
• Identify the main types of logistics
• Describe the fundamental tasks associated with logistics
• Identify the main steps in the supply chain process
• Differentiate among the various technologies that enable and support supply chain management
• Identify the main categories associated with material handling
• Differentiate among the various technologies that enable and support material handling
• Describe what inventory is and its importance
• Define lead time and its effect on inventory
• Determine the appropriate amount of inventory needed based on the situation
• Define Just-In-Time inventory
• Differentiate among the three types of inventory costs
• Describe how inventory management works
• Identify different types of inventory packaging
• Define product distribution and describe its importance
• Define warehousing and describe its role in supply chain management

• Identify steps involved in order processing
• Define material handling systems and describe how they function
• Identify different modes for transporting goods

DWG-501 Blueprint Reading Fundamentals I
• Explain the purpose of blueprints
• List other terms used for blueprints
• Describe methods of creating an engineering drawing
• Explain the purpose and contents of a title block
• Explain the importance of standards for engineering drawings
• List the basic shapes used in engineering drawings
• Identify types of lines shown on engineering drawings
• Identify the angle types seen on engineering drawings
• Explain the relationships that exist between two or more lines
• Explain the relationships that exist between two or more circles
• Explain the relationships between lines, circles, and angles
• Determine the number of views required to define an object
• Explain the difference between isometric and orthographic drawings
• Describe the "glass box" method of illustrating views on an engineering drawing
• Interpret engineering drawings when shown an object
• Explain how views are arranged in a multiview drawing
• Identify views on an engineering drawing
• Describe the purpose of a sectional view
• Describe the function of cutting planes
• Define how front views are selected
• Identify each type of line used in an engineering drawing
• Describe the function of three line types used in an engineering drawing: visible, hidden, and center
• Describe the function of line precedence
• Identify line types given an engineering drawing
• Interpret hidden features on an engineering drawing
• Interpret views from viewing planes

MEA-501 Introduction to Precision Instruments
• Explain the difference between precision and accuracy
• Identify the resolution of a precision instrument
• Determine the discrimination of a precision instrument
• Identify the basic components of a measurement

MEA-502 Rules
• Identify the key components of the precision rule
• Interpret a rule's graduation lines
• Identify rules based upon their measurement scale
• Choose which type of precision rule to use to measure a length
• Use the precision rule to accurately measure a length

MEA-503 Calipers
• Identify all of the parts of a caliper

- Describe how the parts work together to measure
- Interpret the graduation scales on the caliper
- Zero set your caliper
- Use the caliper to measure a length and depth
- Properly care for your caliper MEA-504 Micrometers
- Identify the parts of a micrometer
- Describe how the parts work together to measure a product
- Interpret the graduation scales on the standard and vernier micrometer
- Use the micrometer to accurately measure a distance
- Properly care for your micrometer

LEA-501 Introduction to Lean Manufacturing
- List the major contributions in the history of lean manufacturing
- Identify the principles and practices of using lean manufacturing
- Name the three essential elements of the Toyota Production System
- List the principles of workplace organization
- Identify the methods used to organize the workplace
- Recognize the methods used to measure workplace organization
- Define the 5S meaning of Sort
- Match Sort with its requirements and compliance activity
- Identify key actions for Sort
- Explain how Sort is executed in the workplace
- Define the 5S meaning of Straighten
- Match Straighten with its requirements and compliance activity
- Identify key actions for Straighten
- Explain how Straighten is executed in the workplace
- Define the 5S meaning of Shine
- Match Shine with its requirements and compliance activity
- Identify key actions for Shine
- Explain how Shine is executed in the workplace
- Match Standardize with its requirements and compliance activity
- Identify the key actions for Standardize
- Explain how Standardize is executed in the workplace
- Understand Sustain requirements and compliance activity
- Identify the key action steps for Sustain
- Explain how Sustain is executed in the workplace

QUA-501 Quality Systems
- Define quality, customer, and expectations
- Identify the source of expectations
- Define quality management systems
- Describe the history of quality management systems
- Define Total Quality Management (TQM)
- Identify who is involved in quality
- Give examples of how customers and companies benefit from quality systems
- Describe the International Organization for Standardization (ISO)
- Describe the Plan, Do, Check, Act (PDCA) cycle as applied to ISO standards
- State the goals of ISO 9001:2000
- Describe some of the industries impacted by ISO standards

• Define standards
• State the purpose of international standards
• Define quality organization
• Describe where a quality system comes from
• Identify the four levels of quality documentation
• Identify some typical parts of a quality organization
• Discuss the roles and the challenges quality organizations face
• Explain why quality personnel must be independent
• Describe the roles and responsibilities of Quality Assurance personnel
• Define inspection
• Describe the inspection process

QUA-503 Statistical Process Control I
• Define statistical process control
• Identify and explain the three basics of statistical process control
• Explain the types of variation that exist in a process
• Explain the history of statistical process control
• Identify the different types of variation
• Define and explain the six common causes of variation
• Explain the principles of probability
• Calculate the probability of an event
• Construct a histogram
• Explain the concepts of standard deviation
• Define the purpose of a control chart
• Explain the fields on a control chart
• Prepare a new control chart
• Calculate X-bar
• Calculate X-double bar
• Calculate R-bar

AUT-501 Introduction to Industrial Automation
• Understand the role and importance of automated processes
• List the power sources of some automated processes
• Identify different types of components used in pneumatic/electro-pneumatic installations or circuits
• Define SCADA
• Identify the components and stations of the SMC MAP 205 system
• Identify the assembly steps performed at each station
• Identify common manipulator types used in a pneumatic system

CNC-501 Introduction to Machining
• Identify different classifications of tools
• List methods of removing metal
• List methods of shaping metal
• List common machining operations
• Identify different classifications of machine tools
• List different methods of controlling a machine tool
• List the advantages of manual, automatic, and CNC controlled machine tools
• Identify the major areas of a CNC control
• Understand the history of CNC machine tools

- Identify the major areas of a CNC controller
- Identify common features on a CNC controller
- Identify different classifications of machining personnel
- Identify the duties and requirements of various personnel classifications
- Recognize the available career paths for production CNC operators
- Define facility layout
- Identify different classifications of manufacturing facility layouts
- List the advantages of each facility layout
- Recognize the factors that determine which facility layout is chosen

Sector: Advanced Manufacturing

UNDERGROUND/SURFACE COAL MINER

CREDENTIAL

Mine Safety and Health Administration (MSHA 5000-23) New Miner
(https://webapps.dol.gov/elaws/elg/msha.htm)

** The MSHA 5000-23 must be paired with another related credential to meet eligibility requirements for WorkINdiana. **

EXAM

None, unless used in the delivery of the training.

AGE & FELONY RESTRICTIONS

- No formal age restrictions.
  - Employers can establish age restriction.
- Individuals with a criminal record could be restricted from certain work-related activities (e.g., handling/using explosives).

NEW MINER CERTIFICATION REQUIREMENTS

The instructor of the required health and safety training must complete, keep record of, and submit appropriate MSHA forms documenting the training hours of all receiving the certification.

LEARNING OUTCOMES

Before a new miner begins work he or she must receive a minimum of four hours of training in the following 7 subjects:

Introduction to the Work Environment – *Individuals must know how to:*

- Recognize potential hazards in drilling, blasting, hauling, crushing, conveying and stockpiling.
- Demonstrate knowledge of plant layout, traffic patterns, PPE requirements and important health and safety issues in active work areas.

Recognition and Avoidance of Hazards – *Individuals must know how to*:

- Identify potential hazards in the quarry environment including electrical hazards, machinery hazards, fall hazards, engulfment hazards, hazardous energy, confined spaces, materials handling, water hazards, and ground control hazards.

Emergency Medical Procedures, Escape and Emergency Evacuation Pans, and Firefighting Warnings/Procedures – *Individuals must know how to:*

- Explain/identify emergency evacuation plans and alarms.
- Demonstrate how to select, use and maintain firefighting equipment.
- Identify fire and explosion hazards and demonstrate steps to prevent fire and explosion.
- Demonstrate knowledge of alarms and signals and what to do in an emergency.

Health and Safety Aspects of Assigned Tasks – *Individuals must know how to:*

- Demonstrate correct job performance and perform tasks in accordance with the health standards outlined in the training.
- Statutory Right of Miners and Representatives.
- Identify the statutory rights of miners and representatives under the Mine Safety & Health Act of 1977 and 30 CFR.
- Identify line of Authority and Responsibilities of Supervisors, Miners and their Representatives.
- Explain MSHA's role and responsibility, the personal responsibility of every employee including supervisors, and who has the responsibility and authority to correct workplace hazards.
- Rules and Procedures for Reporting Hazards.
- Explain the steps to get issues addressed and what to do if corrective action is not taken.

A new miner must receive instruction in the following subjects no later than 60 days after beginning work. New miners must receive all 24 hours of the required training within 90 days after beginning work:

Use, Care and Maintenance of Respiratory Devices – ***Individuals must know how to:***

- Demonstrate how to select, use care and maintain respirators.
- Explain limitations of respirators.
- Identify respiratory hazards and precautions.

First Aid Methods – ***Individuals must know how to:***

- Explain basic lifesaving methods, steps to protect from blood borne pathogens, emergency response plan, where equipment is located and how to control the situation.

Sector: Business and Administration Support

ADMINISTRATIVE ASSISTANT (1)

CREDENTIAL

Internet Computing Core Certification (IC^3): Ability to operate computer/Internet in a workplace setting
(http://www.certiport.com/portal/desktopdefault.aspx?page=common/pagelibrary/ic3_home.html)

REQUIREMENTS

Successfully pass all three exams to obtain credential.

AGE & FELONY RESTRICTIONS

- Recommend that individuals be at or above the age of 14.
- Individuals with a criminal record can take this exam.

EXAM 1: LEARNING OUTCOMES FOR COMPUTING FUNDAMENTALS

Computer Hardware, Peripherals and Troubleshooting – *Individuals must know how to:*

- Comprehend computers and technology, as well as various components, peripherals, and input-output devices.
  - *Examples*: Printers, scanners, and cameras.
- Identify computer equipment, shield hardware from theft or damage, and solve universal hardware problems.

Computer Software – *Individuals must know how to:*

- Identify common applications and understand how software and hardware perform their operations.
  - *Examples*: Word processing, databases, spreadsheets, multimedia, and presentation software.

Using an Operating System – *Individuals must know how to:*

- Define what an operating system is, how it functions, and how to maneuver it.
- Operate various windows, folders, files and shortcuts as well as install, uninstall, and run applications
- Identify popular operating systems and their abilities.
  - *Examples:* Windows, Linux, and Macintosh OS.

EXAM 2: LEARNING OUTCOMES FOR KEY APPLICATIONS

Common Program Functions – *Individuals must know how to:*

- Locate, open and exit an application, recognize and modify interface elements, and operate online help.
- Execute basic file-management, editing and formatting, and printing/outputting functions.

Word Processing Functions - – *Individuals must know how to:*

- Modify the format of text and documents as well as utilize available formatting and word-processing tools.
  - *Examples*: Conduct document review, security, and collaboration.

Spreadsheet Features - – *Individuals must know how to:*

- Create a spreadsheet, as well as alter the data, structure and formatting.
- Arrange and manipulate data using formulas and functions as well as design basic charts.

Communicating with Presentation Software – *Individuals must know how to:*

- Create and alter basic presentations.

EXAM 3: LEARNING OUTCOMES FOR LIVING ONLINE

Communication Networks and the Internet – *Individuals must know how to:*

- Recognize network fundamentals and the pros and cons of network computing.
  - *Examples:* Roles of clients and servers in a network, and the elemental principles of security.

Electronic Communication and Collaboration – *Individuals must know how to:*

- Identify variations of electronic communication/collaboration and how to properly operate.
- Operate an electronic mail application as well as identify common problems associated with electronic communication.
  - *Examples*: Junk mail, delivery failure, viruses, and fraud.

Using the Internet and the World Wide Web – *Individuals must know how to:*

- Operate the Internet and various Web sites as well as utilize a Web browsing application.
- Identify how content is created, located, and evaluated on the World Wide Web.

The Impact of Computing and the Internet on Society – *Individuals must know how to:*

- Identify how computers are used at various settings (home, school, and work) and understand how computers should be used safely, legally, and ethically.

Sector: Business and Administration Support

ADMINISTRATIVE ASSISTANT (2)

CREDENTIAL

Microsoft Office User Specialist Certifications (MOS) (https://www.microsoft.com/en-us/learning/mos-certification.aspx)

AGE & FELONY RESTRICTIONS

- Recommend that individuals be at or above the age of 14.
- Individuals with a criminal record can take this exam.

THE MICROSOFT OFFICE USER SPECIALIST EXAM

- To be certified, individuals must score 80% on one of the following exams: Word 2010, Excel® 2010, or PowerPoint® 2010.
- Exams can take up to 90 minutes.
- The exams measure the abilities to accomplish the learning tasks listed below their respective area (e.g., Word 2010).
- Must possess a High School Diploma or equivalent, or have a minimum TABE® score established by the training provider.

LEARNING OUTCOMES FOR WORD 2010 – *Individuals must know how to:*

- Share and maintain to documents by applying different views, applying protection, managing document versions, sharing and saving, and applying a template to a document.
- Format content by applying font and paragraph attributes, navigating and searching through a document, applying indentation, tab, and space settings to paragraphs, creating and manipulating tables, and applying bullets to a document.
- Apply page layout and reusable content by applying and manipulating page setup settings, applying themes, constructing content in a document by using the Quick Parts tool, creating and manipulating page backgrounds, and creating and modifying headers and footers.
- Include illustrations and graphics in a document by applying and manipulating text boxes, and inserting and formatting pictures, shapes, WordArt, SmartArt, and Clip Art.
- Proofread documents by using spelling and grammar checking options, configuring AutoCorrect settings, and inserting and modifying comments in a document.
- Apply references and hyperlinks through creating endnotes, footnotes, and table of contents, and inserting hyperlinks using text, graphics, headings and bookmarks.
- Perform mail merge operations through its setup and execution.

LEARNING OUTCOMES FOR EXCEL® 2010 – *Individuals must know how to:*

- Manage the worksheet through navigating, printing, and personalizing (e.g., manipulating settings, ribbon tabs, and groups) the document.
- Create cell data by constructing the cell data, applying AutoFill, and applying and manipulating hyperlinks.
- Format cells and worksheets through applying and modifying cell formats, merging or splitting cells, creating row and column titles, hiding and unhiding rows and columns, manipulating page setup options for worksheets, and creating and applying cell styles.
- Manage worksheets and workbooks by creating and formatting worksheets, and manipulating window and workbook views in the document.
- Apply formulas and functions by creating basic formulas, precedence enforcement, and applying cell references, conditional logic, named ranges, and cell ranges.
- Present data by creating charts, applying and manipulating illustrations and images, and applying Spark lines.

- Share worksheet data with others by sending the file electronically and saving the file in different versions.
- Analyze and organize data by filtering and sorting data, and applying conditional formatting.

LEARNING OUTCOMES FOR POWERPOINT® 2010 – ***Individuals must know how to:***

- Manage the PowerPoint's environment by adjusting views, manipulating the PowerPoint's window, and configuring the Quick Access Toolbar and PowerPoint file options (e.g., proofing and save options).
- Create a presentation by constructing and editing photo albums, applying slide size and orientation settings, the adding, formatting, and removal of slides, inputting text, and formatting text and text boxes.
- Manipulate and modify graphical elements, images, SmartArt, WordArt, and shapes, and edit video and audio content within the presentation.
- Create and insert charts and tables, applying chart elements, and manipulating chart layouts and elements.
- Apply transitions and animations to presentations.
- Collaborate on presentations by managing internal comments and applying proofing tools (e.g., spelling and thesaurus features).
- Prepare presentations by saving, sharing, printing, and protecting (e.g., setting a password).
- Deliver a presentation by applying presentation tools, setting up slide shows, setting presentation timing (e.g., adjusting slide's timing for transition and/or animation), and recording the presentation.

Sector: Business and Administration Support

BOOKKEEPER

CREDENTIAL

QuickBooks (https://quickbookstraining.com/quickbooks-certification/)

THE QUICKBOOKS EXAM

- Must be able to type 35 WPM.
- Must be computer literate and possess knowledge of windows-based computer applications.
- 85 multiple choice exam and must score 80% to pass.
- Exam cost is $150.
- The exam measures the abilities to accomplish the learning outcomes listed below.

AGE & FELONY RESTRICTIONS

- No age requirement listed.
- Individuals with a criminal record (specifically theft) would not be suited for this training.

LEARNING OUTCOMES

QuickBooks Setup – *Individuals must know how to:*

- Identify required information prior to setting up a QuickBooks file.
- Create a new company data file in QuickBooks.
- Keep lists and preferences from an old file while removing old transactions.
- Customize the home page.
- Setup customer, vendor, and items lists.

QuickBooks Utilities & Knowledge – *Individuals must know how to:*

- Navigate QuickBooks.
- Backup and restore data files.
- Determine the release number and how to update QuickBooks.
- Use QuickBooks in a single-user and multi-user mode.
- Identify QuickBooks' versions and editions for a specific year.
- Password protect QuickBooks.
- Use preferences.

List Management – *Individuals must know how to:*

- Manage lists by adding new entries, deleting entries, editing entries, and merging entries.

Items – *Individuals must know how to:*

- Use QuickBooks items to perform necessary accounting entries.
- Identify different types of items and when to use each type.
- Use items for different types of scenarios (e.g., products and services for a specific price).

Sales – *Individuals must know how to:*

- Identify who should be listed in the Customer Center.
- Navigate and use the Customer Center.
- Complete the workflow for invoicing and sales receipts.
- Use QuickBooks' invoicing cycle (e.g., undeposited funds, accounts receivable, and checking accounts).

- Record customer credit.
- Create statements.
- Handle bounced checks.

Purchases – *Individuals must know how to:*

- Identify who should be listed in the Vendor Center.
- Navigate the Vendor Center.
- Operate workflows to make purchases for entering and paying bills, writing checks, and using debit and credit cards.
- Record transactions in the purchase workflows and a vendor credit.
- Complete inventory workflow.
- Setup, collect, and pay sales tax.
- Perform bank reconciliations.

Payroll – *Individuals must know how to:*

- Differentiate the Payroll Services available.
- Setup Payroll using Payroll Setup Wizard to establish employee's earnings and sick/vacation time, and track sick/vacation time.
- Setup Payroll Schedules.
- Run payroll.
- Pay Payroll Liabilities.
- Prepare payroll forms in QuickBooks.
- Track time and use it for payroll or invoicing customers.

Reports – *Individuals must know how to:*

- Use the Report Center.
- Customize and memorize reports.
- Understand the basic question each report answers.
- Process multiple reports.
- Send reports in Excel.

Basic Accounting – *Individuals must know how to:*

- Understand the basic meaning of financial statements.
- Differentiate between cash and accrual reports.
- Set a closing date.
- Create a journal entry.

Customization – *Individuals must know how to:*

- Memorize transactions.
- Setup multiple users and give different levels of access to users.
- Create custom fields.
- Customize an invoice.

Sector: Business and Administration Support

CUSTOMER SERVICE/TECHNICAL SUPPORT RESPRESENTATIVE

CREDENTIAL

Technology Services Industry Association Certified Support Professional (TSIA CSP-1), (https://www.tsia.com)

Recommend pairing this with Excel or similar training

THE CSP-1 EXAM

- Must possess a High School Diploma or equivalent, or be ready to complete the equivalent within the year.
- Cost is $140-$160.
- The exam measures the abilities to accomplish the learning outcomes listed below.
- Length of training is three (3) weeks.

AGE & FELONY RESTRICTIONS

- No age requirement listed.
- Unable to determine.

LEARNING OUTCOMES

Showing Customers You Care – *Individuals must know how to:*

- Discover the customer service role in technical support.
- Develop a customer-focused attitude.
- Integrate ethics and values into the technical support environment.

Using Language to Serve the Customer – *Individuals must know how to:*

- Use positive language.
- Use language the customer can understand.
- Use transitions to move through the call.
- Build rapport.

Opening the Call – *Individuals must know how to:*

- Open the call.
- Interrupt the caller.
- Transfer the call.

Uncovering Customer Issues– *Individuals must know how to:*

- Question to determine customer needs.
- Hone listening skills.
- Confirm understanding.

Solving Customer Problems – *Individuals must know how to:*

- Develop a problem statement.
- Classify the problem.
- Handle requests you cannot fulfill.

Putting Out Fires – *Individuals must know how to:*

- Maintain your poise with challenging calls.
- Prevent challenges from escalating.
- Deal with upset customers.

Closing the Call – *Individuals must know how to:*

- Secure customer satisfaction.
- Close and document the call.

Sector: Business and Administration Support

CUSTOMER SERVICE/CALL CENTER REPRESENTATIVE

CREDENTIALS
International Business Training Association's Certified Business Professional (CBP), Customer Service Certification and Internet (http://www.ibtalearning.com/exams)

The Certified Business Professional (CBP) must be paired with IC3, Excel or similar software training

The CBP program establishes a foundation-level, industry-neutral certification for business professionals enabling employers and the candidate to have a platform to develop the CBP for targeted positions within corporations. The CBP also develops important life-skills that transcend the work environment into many aspects of living.

The CBP training program by itself is twenty-one (21) hours in length.

CBP Exam

CBP exams consist of multi-choice and scenario based questions. The exam costs $125.

CBP Customer Service Certification

- **AGE & FELONY RESTRICTIONS**
  - Individuals with a criminal record can take this exam.

LEARNING OUTCOMES

- **Customer Service Areas of Focus**
  - Honing customer communication skills
  - Discerning customer needs
  - Fine-tuning telephone skills
  - Knowledgeable in web-based customer service
  - Professional ways to handle conflict
  - Managing stressful situations
  - Proper time management skills

- Call Center Focused Training
  - Excellent telephone service
  - Attitude and interpersonal skills
  - Greeting customers
  - Effective call handling
  - Identifying customer needs
  - Handling difficult calls

Customer Service/Retail Sales and Call Centers

CREDENTIAL

National Retail Federation Sales Representative (NRFSR) (https://nrf.com/career-center/certifications-and-training/customer-service-and-sales-certification)

The National Retail Federation Sales Representative (NRFSR) certification, if used for a call center, must be paired with IC3, Excel or similar digital training to qualify for WorkINdiana

NRF Sales Representative Certification

- **AGE & FELONY RESTRICTIONS**
  - Individuals with a criminal record can take this exam.
  - At least 16 years old or, if a student, attained at least grade 11 standing, or enrollment in GED prep course

LEARNING OUTCOMES

Major Course Learning Objectives:

RETAIL INDUSTRY OBJECTIVES:

• Understand the expectations of the course.
• Become familiar with the strategies employed in interactive learning.
• Understand the importance of the retail industry in the U.S. economy.
• Understand the economics of retail.
• Distinguish between the various sectors in the retail industry.
• Understand consumer behavior and the role of the sales associate in facilitating customers' purchase decision

CUSTOMER SERVICE OBJECTIVES:

• Recognize the importance of actively participating in company-provided product training as well as follow-up training.
• Review and comprehend written and multimedia material pertaining to products or services produced by the employee's company or trade organization.
• Experience testing and demonstrating products or services.
• Study competitors' products or services, including marketing.
• Assess customers' needs.
• Provide exceptional customer service.
• Apply customer service techniques and tools.
• Demonstrate service excellence to ensure repeat business.

SELLING AND SERVICE OBJECTIVES:

• Review and understand sales goals.
• Differentiate the various components of retail strategy.
• Compare various pricing strategies and policies.
• Identify and prioritize potential customers.
• Follow up with customers.
• Observe customers for buying cues.
• Overcome objections and respond to questions.
• Close and confirm sales.
• Discuss specifics of the sale with customers.

• Handle sales transactions.

STORE OPERATIONS OBJECTIVES:
• Understand the basic functions of Loss Prevention, Inventory Control, Safety, and Merchandising.
• Recognize their role in these functional areas of the retail store.

SOFTWARE OBJECTIVES
• Microsoft Word
• Microsoft Outlook
• Microsoft Excel

Sector: Construction

**** Pre-apprenticeship training should be combined with another credential plus employability skills training. ****

PRE-APPRENTICESHIP CONSTRUCTION HELPER

CREDENTIAL

Pre-apprenticeship Certificate Training (Pre-apprenticeship certificate (must meet DOL standards) + OSHA + combined with another certification training such as MSSC (safety and quality).

REQUIREMENTS

- Must possess a High School Diploma or equivalent, or be ready to complete the equivalent.

EXAMINATION

- Used in the delivery of training.

AGE & FELONY RESTRICTIONS

- Individuals must be at least 18 years of age.
- No restrictions for individuals with a criminal background.
- However, those with a criminal record could have more difficulties securing employment.

LEARNING OUTCOMES

Orientation/ Construction Awareness

- Time Management
- Having Faith
- Explanation of The Indiana Plan
- History and purpose – also classroom rules
- Favorable Attributes
- Attitudes
- Discussion of TRADE applications
- Work reports entry
- Life Skills Curriculum
- Heritage of American Workers
- Introduction to Construction
- Properly filling out applications
- Hurt Feelings
- Nine Aptitudes
- Apprenticeship aptitude test
- Elevation Identification

OSHA/ Safety

- OSHA Training
- Log work report
- MSSC Safety 9 (optional)
- Log Work Report
- Trade Apprenticeship Coordinator (contact)

Quality

- Blueprint reading/ MSSC Quality
- Log Work Report
- Trade Apprenticeship Coordinator
- Blueprint reading
- MSSC Quality (optional)
- Log Work Report

Test/ Math Skills

- Quality Review and Test
- Math Skills

Pre-apprentice Training Manuals

- Fractions and Decimals
- Apprenticeship Job Interviews
- Crane Hand Signals
- Trades Discussion/ Video presentation of various trades
- Job Descriptions
- Income
- Log Work Report
- Ratio Proportions and Percent's: Introduction to "Formula" theory using BOX method to solve complex percent equations forces student's attention to detail
- Directed Numbers to build students attention to detail
- Graphic Math
- Trades Discussion/ Video presentation of various trades
- Tools
- Practice using Interviewing Skills
- Log work report
- Algebra
- Trades Discussion/ Video presentation of various trades
- Drug testing

Fitness for Duty

- Team Field Exercises

- Don't Quit
- Log Work Report
- Geometry – Stressing Angle Relationships
- Review all Trade Math
- Log Work Repo
- Budgeting Skills
- Life Skills Curriculum

SUCCESS

- Work Report Review

Sector: Health Care

CERTIFIED NURSE AIDE

CREDENTIAL

Indiana Nurse Aide Certification (CNA) (http://www.allnursingschools.com/nursing-careers/certified-nursing-assistant/degrees/)

NURSE AIDE COMPETENCY EVALUATION

- Administered by Ivy Tech Community College, in compliance with the Indiana State Department of Health regulations.
- Consists of two main parts: a written exam and a hands-on skills exam.

AGE & FELONY RESTRICTIONS

- Individuals must be at least 14 years of age.
- Individuals with a criminal record are not disqualified from this training.
  - High likelihood that the career pathway will be limited to a CNA related position.

REQUIREMENTS TO OBTAIN STATE CERTIFICATION

- Criminal History check, Mantoux testing or chest X-ray for tuberculosis, and a physical examination.
- Complete an Indiana State Department of Health approved training program.
  - At least 30 hours of classroom training, at least 75 hours of clinical experience, and successful completion of the written and skills competency evaluation.

CNA Written Exam

- Contains 100 multiple choice questions.
- *Focus areas include* hygiene, nutrition, infection control, therapeutic procedures, workplace conduct, and candidate's knowledge of patient communication, patient/client rights and ethical behavior, and psychosocial care questions about the emotional, mental, cultural and spiritual needs of patients.

CNA Clinical Skills Exam

- Requires a demonstration of five skills on a volunteer or live model, as chosen by the test administrator from the Skills Test Chart provided below.

AREAS OF KNOWLEDGE:

Individuals must be able to:

- Provide for the daily care of the resident.
  - *Examples*: Bathing, dressing, grooming, eating, transferring, ambulating, and elimination.
- Provide for the resident's comfort.
  - *Examples*: Assist the resident in developing trust, be empathetic and open to the family, actively listen, and create a positive home-like environment.
- Provide for the resident's safety.
  - *Examples*: Immediately report safety issues, follow infection control practices, and maintain a clean and safe environment.
- Provide for the resident's health needs.
  - *Examples*: Respond to call lights immediately, assist the nurse during medical procedures and emergencies, immediately inform the nurse of any changes in the resident's

appearance, behavior, or mood, and accurately establish measurements, such as temperature, weight, pulse, respirations, and blood pressure.

LEARNING OUTCOMES FOR THE CLINICAL SKILLS TEST (Hands-On)

Individuals must be able to:

- Perform a variety of skills in a setting resembling a nurse-aide work environment while properly interacting and communicating with the patient.
  - *Examples*: Taking and recording patient blood pressure, bathing and dressing a patient, helping with range of motion exercises, and providing catheter care.
- Five of the following skills must be demonstrated correctly in order to pass the clinical skills portion of the certification exam:

Skills Test Chart (CNA)

1.	Wash hands	13.	Measure and record blood pressure
2.	Provide food care	14.	Perform passive range of motion exercise for client knee and ankle
3.	Assist to ambulate using transfer belt	15.	Count and record client's radial pulse
4.	Assist with use of bedpan	16.	Don and remove gown and gloves
5.	Apply one knee-high elastic stocking	17.	Perform passive range of motion exercises for client shoulder
6.	Count and record patient's respirations	18.	Position client on side
7.	Measure and record weight of ambulatory client	19.	Provide catheter care for female client
8.	Dress client with affected (weak) right arm	20.	Clean dentures
9.	Provide fingernail care	21.	Make an occupied bed
10.	Give modified bed bath	22.	Provide mouth care
11.	Measure and record urinary output	23.	Provide perineal care for female client
12.	Transfer from bed to wheelchair using transfer belt	24.	Feed client who cannot feed self

Sector: Health Care

EMERGENCY MEDICAL TECHNICIAN

CREDENTIAL

Emergency Medical Technician Basic (EMT-B) (http://www.in.gov/dhs/3525.htm)

AGE & FELONY RESTRICTIONS

- Must be at least 18 years of age.
- Individuals with a criminal record can be declined based on the prior offense.

LEARNING OUTCOMES

- Able to provide primary care evaluation.
- Able to provide pediatric and geriatric care.
- Proficient in emergency medication and urgent respiratory procedures.
- Competent with Automatic External Defibrillators (AED).
- Able to perform cardiopulmonary resuscitation (CPR) and oxygen administration.
- Able to perform bandaging and splinting.
- Knowledgeable in non-visualized airways.
- Able to perform bag-valve-mask respiratory support.
- Educated in spinal immobilization.
- Comprehension of a variety of medications and able to administer appropriately.
  - *Examples*: ASA, epinephrine auto-injectors, patient assisted medications (inhalers), and activated charcoal.
- Skilled in intravenous line maintenance.
  - *Examples*: Maintain a continuous peripheral intravenous infusion at the specified drip rate using aseptic techniques, monitor the patient's vital signs and IV, record at regular intervals all procedures and assessments of patient condition, record fluid intake/output, and identify how to react to complications from IV fluid, such as an allergic reaction.
- Knowledgeable about ambulance operations.
  - *Examples*: Transportation in an ambulance, cot, wheelchair, or escort, dependent on the patient's condition.
- Able to perform transport techniques.
  - *Examples*: Bed to cot, floor to bed or cot, bed to chair, or floor to chair.
- Knowledgeable about appliance and equipment.
  - *Examples*: Wheelchairs, home oxygen systems and urinary catheters.
- Knowledgeable about death and dying, hospice programs, requests for limited resuscitation and family and staff crisis intervention.
- Able to define Sudden Infant Death Syndrome (S.I.D.S.) and able to identify common characteristics and common physical findings of S.I.D.S.
- Able to distinguish between S.I.D.S. and child abuse/neglect.

MINIMUM REQUIREMENTS TO OBTAIN STATE CERTIFICATION

- Completion of an Indiana accredited EMT training program.
  - Individual shall complete 144.5 hours of minimum initial training, which includes 128.5 hours class, 8 hours hospital, and 8 hours ambulance.
- The Indiana Ambulance Association (IAA) requires certification in CPR.
- Apply for the EMT certification through the IAA and pass the IAA's certification exam.
- Apply for the National Registry of Emergency Medical Technician (NREMT) certification.

Sector: Health Care

DENTAL ASSISTANT WITH LIMITED RADIOGRAPHY LICENSE

CREDENTIAL

Limited Dental Radiographer License (LRC) (http://www.in.gov/isdh/23279.htm)

EXAM

The Dental Assisting National Board (DANB) Radiation Health and Safety (RHS) Examination consists of 100 multiple choice questions which must be completed in 1.25 hours. Exam components: Expose and Evaluate (37%), Process (16%), Mount and Label (11%), Radiation Safety- Patient (24%), Radiation Safety- Operator (12%).

REQUIREMENTS

- Complete a Commission on Dental Accreditation (CODA), accredited educational program in radiography or any other dental radiography program approved by the Indiana State Department of Health, Division of Medical Radiology Services. Training lasts 14 to17 weeks and costs $2,089 to $4,500.
- Be certified by a licensed practitioner or licensed hygienist as proficient in performing procedures in the limited dental curriculum.
- Pass either the Dental Assisting National Board (DANB) Certified Dental Assistant (CDA) or DANB Radiation Health and Safety (RHS) examination or any other exam approved by the Indiana State Department of Health, Division of Medical Radiology Services.
- Possess, or in the process of earning, a high school diploma or equivalent. Must have a high school or equivalent to obtain the Limited Dental Radiographer License in Indiana.

AGE & FELONY RESTRICTIONS

- Must be at least 18 years of age.
- Individuals with a felony record may find it difficult to be approved for this program and/or licensure.

LEARNING OUTCOMES

Individuals must know how to:

- Identify major anatomical landmarks of the teeth, jaw, oral cavity and adjacent structures of the skull.
- Understand basic radiation biology concepts.
- Practice radiation safety procedures for both operator and patients.
- Operate radiographic exposure equipment.
- Catch and correct common intraoral and extra-oral radiographic exposure errors.
- Use radiographic processing equipment and digital equipment.
- Detect and fix common radiographic processing errors.
- Mount and label dental radiographs.
- Apply effective infection control techniques.
- Implement necessary Quality Assurance procedures.

Students will receive training in dental anatomy, pathology and terminology, dental instruments and materials. There is a lecture component, a lab component, and a clinical component to the class. Each student will be required to do an externship at the office with which they are employed or through the dental careers school. The externship portion consists of supervised experiences in a clinical environment. The course requires competencies and evaluations completed by both students and the supervising dentist.

Sector: Health Care

HOME HEALTH AIDE

CREDENTIAL

Home Health Aide HHA (Indiana State Department of Health (https://secure.in.gov/isdh/20126.htm)

REGISTRATION

Home Health Aides in the State of Indiana need to have successfully completed a competency evaluation program that addresses each of the subjects listed in the state rule. Once having completed a an evaluation program consisting of at least 75 hours of training (16 hours of which must be supervised practical training), home health aides need to be placed on the Indiana Nurse Registry via the Indiana Professional Licensing Agency by their training provider.

REQUIREMENTS TO REGISTER WITH THE INDIANA NURSE AIDE REGISTRY

- Must have completed a competency evaluation program
- Training program provider must co-sign state form 49560 (R6/6-12) and submit to Indiana State Department of Health

AGE & FELONY RESTRICTIONS

- No minimum age requirement.
- No restrictions for individuals with a criminal background to take the certification.
    - Individuals with a criminal record will most likely have difficulties securing employment with this certification.

LEARNING OUTCOMES

Section I: Homemaker/Companion

- Home healthcare orientation and communication
- Working with people, emergency procedures and infection control
- Caring for client environment
- Food planning, preparation and serving

Section II: Personal Care Assistant

- Geriatric care
- Therapeutic diets
- Basic skin care
- Assist with transfers
- Common diseases
- Working with children
- Care of the dying
- CPR training

Section III: Home Health Aide

- Rehabilitation
- Bed-ridden clients
- Vital signs
- Special procedures

MEDICAL ADMINISTRATIVE ASSISTANT

CREDENTIAL

National Healthcare Association – Certified Medical Administrative Assistant (CMAA)
(http://www.nhanow.com/medical-admin-assistant.aspx)

EXAM

The exam is made up of 110 multiple-choice questions and 20 pretest questions and is 2 hours and 10 minutes. The test covers seven knowledge domains. A scaled score of 390 is required to obtain the certification.

REQUIREMENTS TO TAKE THE CCMA EXAM

- A high school diploma is required to take the exam; however, individuals without a high school diploma may take the certification exam, and if successful, they will receive a provisional certification. Upon receipt of the high school diploma or equivalency the individual will be granted the full certification.
- Have completed a training program or have one-year work experience in the field.
  *An individual holding a CMAA certificate is required to undergo 10 hours of continuing education every two years.

AGE & FELONY RESTRICTIONS

- Must be at least 18 years of age.
- Individuals with a criminal record would not qualify for this training.

LEARNING OUTCOMES

Scheduling – *Individual must know how to:*

A. Evaluate different types of patient scheduling
- Identify the patient (e.g., the same last name, same first AND last name, and same date of birth).
- Interpret the purpose of the visit.
- Arrange the procedures in the scheduling book.
- Knowledge of wave booking
- Knowledge of double-booking
- Knowledge of modified wave
- Knowledge of stream/time-specific
- Knowledge of open booking
- Knowledge of cluster or categorization booking

B. Determine scheduling needs of the facility, as well as new and established patients
- Knowledge of how to input new patient information
- Identify type of service needed by the patient.
- Knowledge of availability on the provider's schedule (e.g., physician and nurse)
- Obtain referrals.
- Knowledge of appointment intervals
- Knowledge of physicians' preferences, needs, and schedule matrix
- Knowledge of block scheduling
- Knowledge of nurses' preferences, needs, and schedule
- Identify dates and times when the schedule needs to be blocked out for the facility.

C. Follow protocol for no-show, missed, cancelled, or follow-up appointments
- Knowledge of fees

- Knowledge of follow-up procedures for no-show, missed, and cancelled appointments
- Knowledge of office policies related to charges for missed appointments
- Check with physician to determine if a patient can be seen.
- Reschedule for later appointments.
- Knowledge of how to document a no-show, missed, or cancelled appointment
- Send out notifications for no-show and missed appointments.

D. Arrange for diagnostic testing and procedures
- Call for pre-authorization for testing and procedures.
- Check for referrals prior to appointment.
- Knowledge of participating or non-participating facilities to arrange for diagnostic testing and procedures
- Verify patient billing address for scheduling needs.
- Verify best method of contact for scheduling appointments.
- Provide patient with instructions for pre-testing or diagnostic procedures.
- Schedule pre-admission testing.
- Ensure patient has the correct address of the facility.
- Ensure patient has the correct name of the referred physician.
- Document information in patient chart.
- Follow-up with patient to ensure compliance with physician's instructions.

E. Confirm future appointments
- Follow HIPAA guidelines (e.g., what should or should not be disclosed when scheduling and confirming future appointments).
- Instruct patient to bring insurance and identification to the appointment.
- Verify patient's insurance is participating with physician's office.
- Knowledge of how to document a no-show, missed, or cancelled appointment
- Check for referrals prior to appointment.
- Inform patient of co-pay requirement.

Patient Intake – *Individual must know how to:*

A. Confirm demographic information with patient
- Maintain appropriate demographic data (e.g., address, phone number, date of birth, insurance information).
- Check that the patient's Protected Health Information (PHI) has been entered.
- Confirm the patient's advanced directives.
- Knowledge of special needs in regards to special paperwork (e.g., visually impaired patients, language barrier patients)
- Ensure demographic form is signed.
- Knowledge of best method of contact for confirming demographic information

B. Verify insurance information
- Verify coverage benefits.
- Verify co-pay.
- Review insurance card.
- Review form of photo identification.
- Verify changes in coverage.
- Verify whether patient has secondary and/or tertiary coverage.
- Knowledge of the Birthday Rule
- Verify policyholder.
- Determine which laboratory is the appropriate facility for a patient to use.
- Determine benefit information.

- Identify the difference between the guarantor and the patient, if it exists.
- Knowledge of basic coding (e.g., ICD, CPT)
- Ability to communicate with insurance company

C. Ensure forms are updated or completed
- Ensure forms are signed (e.g., assignment of benefits, advanced directives, living will, health history, consent to release information, records release, HIPAA release, financial responsibility, DNR, health care surrogate).

D. Prepare encounter form
- Knowledge of other practitioners and physicians for referrals
- Basic knowledge of procedures performed in the back office
- Verify information on encounter form.
- Recognize, but do not interpret, basic coding (e.g., ICD, CPT).

E. Prepare daily charts
- Retrieve and file the record.
- Create medical record.
- Knowledge of how to retrieve future appointment schedules
- Ensure delivery to the proper physician.
- Match the correct patient to the correct chart.
- Update the patient's chart with progress notes.

Office Logistics – *Individual must know how to:*

A. File medical records
- Knowledge of filing systems (e.g., electronic, alphabetical procedures, terminal digit procedures [such as primary, secondary, and tertiary])
- Ability to cross-reference charts
- Basic knowledge of scanning documents
- Basic knowledge of correlation of charts (e.g., labs categorized under laboratories, prescriptions categorized under Prescriptions)
- Basic knowledge of EHR/EMR (Electronic Health Records/Electronic Medical Records)

B. Perform financial procedures
- Collect copayments.
- Create statements (e.g., office visit invoices, pre-invoices).
- Create receipt for payment.
- Knowledge of basic financial terminology (e.g., copay, deductibles, coinsurance, fee schedule)
- Use of petty cash
- Basic knowledge of bookkeeping system (e.g., double or single entry)
- Complete day sheet

C. Evaluate mail deliveries
- Sort and distribute mail.
- Knowledge of different classes of mail (e.g., registered, certified, first-class, priority, FedEx, USPS)
- Verify contents of package against package slip.

Compliance – *Individual must know how to:*

A. Follow HIPAA guidelines
- Ensure patient's privacy and security of protected health information.
- Ensure charts are properly secured (e.g., displayed with personal information covered).
- Use a HIPAA-compliant sign-in sheet.

- Knowledge of what information is not private for authorities and health departments (e.g., child abuse, STDs/STIs, gunshot wounds, HIV)
- Knowledge of record release forms
- Knowledge of who can access patient's chart
- Proper use of passwords
- Knowledge of peer-to-peer information
- Follow HIPAA guidelines for covered and non-covered entities.
- Knowledge of appropriate discussion of medical information (e.g., when and where)
- Knowledge of proper verification of medical information (e.g., what to release and what not to release when verifying information)
- Knowledge of penalties for violating HIPAA practices
- Document release of information (e.g., when and to whom information can be released)
- Knowledge of PHI standards

B. Follow OSHA guidelines

- Adhere to OSHA guidelines.
- Knowledge of MSDS
- Knowledge of how to report an OSHA incident
- Knowledge of the evacuation plans and emergency procedures

C. Follow the Center for Medicare/Medicaid Services (CMS) guidelines

- Report Medicare/Medicaid fraud
- Awareness of consequences of fraud
- Knowledge of the difference between Medicare and Medicaid
- Recognize the CMS-1500 form
- Recognize the UB04

Patient Education – *Individual must know how to:*

A. Explain the Patients' Bill of Rights

- Explain to patient that medical decisions are made by physicians.
- Explain to patient that he/she has the right to go to a medical specialist.
- Explain to patient that he/she has the right to keep the same physician through a procedure or treatment.
- Knowledge of who owns the medical record • Knowledge of disability practices (e.g., ADA compliance)
- Compare and contrast different forms of consent (e.g., implied consent, verbal consent, written consent, expressed consent, implied minor consent).
- Knowledge of basic medical law and ethics (e.g., assault and battery, patient abandonment)
- Explain to a patient that he/she has the right to be seen by another physician

B. Explain the patients' insurance responsibilities

- Explain the difference between copayments and coinsurance.
- Explain deductibles.
- Explain allowed amounts.
- Basic knowledge of insurance practices
- Explain the difference between federal and private insurance.
- Explain an Advanced Beneficiary Notice (ABN)
- Knowledge of the contents of an Explanation of Benefits (EOB)

C. Explain pre- and post-instructions for testing and procedures

General Office Policies and Procedures – *Individual must know how to:*

A. Perform office opening and closing procedures
- Check internal and external messages (e.g., phones, emails, faxes).
- Check that charts are prepared and ready for the day (or next day).
- Check that the amount of petty cash for the day is correct.
- Direct and redirect phones to and from answering service to office.
- Ensure day sheets are balanced.
- Ensure equipment is turned on at open and off at close.
- Clean up reception area.
- Back up data.
- Order supplies.

B. Greet patients upon arrival
- Greet patients with a positive attitude.
- Identify type of visit (e.g., sick or well).
- Identify type of patient (i.e., new or existing).
- Ensure front office is free of obstacles.
- Acknowledge patients upon arrival.
- Notify patients of wait time.

C. Apply telephone etiquette
- Introduce facility and self.
- Identify type of caller.
- Identify caller's need.
- Check on callers with extended hold times.

D. Create correspondences
- Knowledge of templates
- Knowledge of word processing
- Knowledge of different types of letters
- Knowledge of different types of correspondences
- Create letters.
- Use proper greetings and salutations.
- Apply proper postage.
- Obtain required signatures (e.g., who should sign the correspondence?).

E. Demonstrate basic computer skills
- Knowledge of e-mail system (e.g., Microsoft Outlook)
- Knowledge of word processing (e.g., Microsoft Word)
- Knowledge of spreadsheets (e.g., Microsoft Excel)
- Knowledge of internet (e.g., social media, web searching)
- Use of hardware (e.g., copiers, fax machines, scanners)
- Basic HIPAA regulations for the use of the computer
- Skills at computer software

Basic Medical Terminology – *Individual must know how to:*

A. Use medical terminology to communicate with patients and physicians.

B. Recognize abbreviations and acronyms used to complete administrative duties
- Identify the meaning of abbreviations and acronyms (e.g., HX, Pt, H&P, Dx, SOAP, HIPAA, CC, Rx, PHI, CDC, AMA, HMO, and PPO).
- Use of abbreviations and acronyms to complete basic administrative duties

C. Use word parts (i.e., prefixes, roots, suffixes) to define medical terminology
- Basic knowledge of prefixes (e.g., a-, an-, pre-, post-, hyper-, hypo-, peri-, endo-, exo-)

- Basic knowledge of roots (e.g., cardi/o, vascul/o, gastr/o, nephr/o, hepat/o)
- Basic knowledge of suffixes (e.g., -logy, -it is, -osis, -pathy, -ist, - graph)

Sector: Health Care

MEDICAL ASSISTANT

CREDENTIAL

National Healthcare Association, Certified Clinical Medical Assistant (CCMA)
(www.nhanow.com/**certifications/clinical-medical-assistant**)

EXAM

The exam is made up of 150 multiple-choice questions and 10 pretest questions. The test covers six knowledge domains. A scaled score of 390 is required to obtain the certification.

REQUIREMENTS TO TAKE THE CCMA EXAM

- A high school diploma is required to take the exam; however, individuals without a high school diploma may take the certification exam, and if successful, they will receive a provisional certification. Upon receipt of the high school diploma or equivalency the individual will be granted the full certification.
- Have completed a training program or have one-year work experience in the field.
  *An individual holding a CCMA certificate is required to undergo 10 hours of continuing education every two years.

AGE & FELONY RESTRICTIONS

- Must be at least 18 years of age.
- Individuals with a criminal record would not qualify for this training.

LEARNING OUTCOMES

Patient Care– *Individuals must know how to:*

- Identify patients before providing care.
- Perform Clinical Laboratory Improvement Amendments of 1988 (CLIA)-waived laboratory procedures.
- Monitor patient's environment safety (e.g., fall precautions, faulty equipment, transmission precautions).
- Dispose of biohazardous materials as dictated by OSHA (e.g., sharps containers, red bags).
- Use universal, standard, and transmission-based precautions.
- Identify abnormal patient values for triage purposes (e.g., laboratory results, vital signs, diagnostic test).
- Obtain patient vital signs using manual and automatic devices (e.g., pressure cuff, stethoscope, thermometer, pulse oximetry).
- Perform adult and pediatric anthropometric measurements.
- Perform measurement conversions (e.g., weight, height, medication).
- Position patients according to care needs.
- Maintain patient examination rooms.
- Assist healthcare providers during clinical procedures.
- Provide medical instruments according to care needs (e.g., syringe for intramuscular injection, needle holder for suturing).
- Administer oral medications.
- Administer parenteral medications.
  - Topical.
  - Transdermal.
  - Intramuscular.
  - Intradermal.

    - Subcutaneous.
- Perform pulmonary function testing.
- Perform visual acuity tests.
- Perform suture removal.
- Perform basic wound care (e.g., dressing changes, lavage).
- Obtain and label specimens for diagnostic purposes.
- Demonstrate correct body mechanisms in a healthcare setting (e.g., patient transfer, equipment moving, computer use).
- Perform eye and ear irrigation.
- Perform first aid, CPR, and rapid response procedures appropriately.
- Perform appropriate aseptic technique for various clinical situations.
    - Sterilization.
    - Disinfection.
    - Sanitization.
- Modify clinical responses with patients based on special considerations (e.g., pediatric, geriatric, disability, disease progressions).
- Manage inventory of clinical supplies.

Patient Care and Preparation Related to Phlebotomy and EKG -*Individuals must know how to:*

- Conduct appropriate introduction to the patient.
- Explain the phlebotomy procedures to be performed to the patient.
- Review the requisition for testing requirements and patient identity.
- Determine venipuncture site accessibility based on patient age and condition.
- Prepare the patient
    - EKG monitoring (e.g., patient history, cardiac medications, patient positioning)
    - Holter monitoring
    - Telemetry monitoring
- Apply electrodes on patients
    - EKG monitoring
    - Holter Monitoring
    - Patients with special considerations (e.g., right-sided heart, posterior chest, amputations)
- Respond to complications during stress testing.
- Verify patient understanding of Holter monitor procedures.

Communication - *Individuals must know how to:*

- Document medical information using approved medical terminology.
- Communicate with other healthcare professionals using medical terminology.
- Adhere to HIPAA regulations regarding Protected Health Information (PHI).
- Reinforce patient understanding of medical information.
- Observe the chain of command in a healthcare setting.
- Report abnormal patient values to appropriate healthcare providers.
- Conduct written communication with patients and other healthcare professionals.
- Conduct communication with patients and other healthcare professionals using information technology (e.g., EPIC, EMR-HER programs).
- Explain general office procedures to patients.
- Modify communication with patients based on special considerations (e.g., pediatric, geriatric, disability, and disease progression).
- Locate community resources and information for patients/employers.

Office Administration - *Individuals must know how to:*

- Manage patient medical records.
- Obtain patient information (e.g., demographics, insurance, 3rd party payer).
- Obtain patient consent for services.
- Schedule inpatient and outpatient admissions and procedures.
- Manage appointment scheduling**.**
- Adhere to HIPAA regulations concerning insurance.
- Respond during patient refusal of treatment (e.g., against medical advice (AMA)).
- Perform office opening and closing procedures (e.g., answering service, building security).
- Manage physicians' professional schedules.
- Maintain human resources documentation (e.g., licensure, training, CEU's).
- Manage inventory of office supplies.
- Perform basic diagnostic and procedural coding.

Medical Law and Ethics - ***Individuals must know how to:***

- Address patient concerns according to the Patient's Bill of Rights.
- Maintain safety in the workplace according to regulatory standards (e.g., OSHA, Joint Commission, and CLIA).
- Follow chain of custody protocol (e.g., drug testing, rape kits).
- Report illegal and/or unsafe activities in the healthcare environment to proper authorities (e.g., abuse or neglect of patients, harassment, substance abuse, fraud).
- Recognize and respond to emergency situations (e.g., fire, hostage, biological hazard).

Phlebotomy - *Individuals must know how to:*

- **Collections**
  - Demonstrate proper insertion and removal techniques for venipuncture.
  - Perform capillary collection method based on patient age and condition.
  - Ensure patient safety throughout the collection process.
  - Perform venipuncture steps in correct order (e.g., evacuated tube system, syringe, and winged collection set.).
  - Perform capillary (dermal) puncture steps in correct order.
  - Recognize common complications from primary collection (e.g., lack of blood flow, hematoma, petechiae, and nerve injury).
  - Identify problematic patient signs and symptoms throughout collection (e.g., syncope, diaphoresis, nausea, seizure).
  - Follow order of draw for venipuncture.
  - Follow order of draw for capillary collection.
  - Ensure that tube additives are appropriate for testing requirements.
  - Assemble equipment needed for primary blood collections.
  - Invert evacuated tubes with additives after collection.
  - Verify quality of equipment (e.g., sterility, expiration date, manufacturer's defects).
  - Perform blood culture collections.
  - Assist other healthcare professionals with blood culture collections.
  - Collect blood samples for inborn errors of metabolism (e.g., PKU, galactosemia).
- **Processing**
  - Label all specimens.
  - Perform quality control for CLIA-waived procedures.
  - Transport specimens based on handling requirements (e.g., temperature, light, time).

- Explain non-blood specimen collection procedures to patients (e.g., stool, urine, semen, sputum).
- Handle patient-collected, non-blood specimen.
- Avoid pre-analytical errors.
- Adhere to chain of custody guidelines when required (e.g., forensic studies, blood alcohol, drug screen).
- Prepare samples for transportation to a reference (outside) laboratory.
- Coordinate communication between non-laboratory personnel for processing and collection.
- Use technology to input and retrieve specimen data.
- Report critical values to point of care testing.
- Distribute laboratory results to ordering providers.

EKG Monitoring - ***Individuals must know how to:***

- Calculate patient heart rate from the EKG tracing (e.g., 6-second method, R to R, sequencing).
- Identify and resolve artifacts from the tracing (e.g., wandering baseline, somatic, electrical).
- Record 12- lead EKG on patient.
- Verify the leads recorded on an EKG.
- Upload a completed EKG to a patient's electronic medical record.
- Mount a completed EKG for a patients chart.
- Measure a patient's heart rhythm from the EKG tracing.
- Inspect the waveforms of a cardiac cycle for symmetry, direction, and amplitude (e.g., P waves, QRS complexes, ST segments, T waves).
- Measure a patient's heart conduction from the EKG tracking (e.g., PR-interval (PRI), QRS duration, QT- interval).
- Identify the major classification of arrhythmias from the EKG tracing (e.g., sinus, atrial, ventricular, and junctional).
- Identify the major variances to waveforms related to ischemia, injury, or infarction.
- Respond to potentially life-threatening arrhythmias.
- Verify EKG machine paper speed (e.g., 25mm, 50mm).
- Verify EKG machine sensitivity (e.g., h, 1, and 2).
- Maintain EKG equipment and the work environment.
- Recognize pacemaker spikes on an EKG tracing.

Sector: Health Care

MEDICAL CODER (1)

CREDENTIAL

American Health Information Management Association (AHIMA), Certified Coding Associate (CCA) (www.**ahima**.org/**certification**)

The CCA credential is for entry-level coding across all settings, including both hospitals and physician practices. The CCA is currently accredited by the by the National Commission for Certifying Agencies (NCCA).

EXAM

The exam is a two (2) hour, no breaks, 100 multiple-choice item examination consisting of 90 scored items and ten (10) pretest items.

The computer-based examination consists of four-option, multiple-choice questions written at three different cognitive levels: recall, application, and analysis. These levels represent an organized way to identify the performance that practitioners will utilize on the job. An explanation of the three cognitive levels is provided below:

Cognitive Level	Purpose	Performance Required
Recall (RE)	Primarily measuring memory.	Identify terms, specific facts, methods, procedures, basic concepts, basic theories, principles, and processes.
Application (AP)	To measure simple interpretation of limited data.	Apply concepts and principles to new situations; recognize relationships among data; apply laws and theories to practical situations; calculate solutions to mathematical problems; interpret charts and translate graphic data; classify items; interpret information.
Analysis (AN)	To measure the application of knowledge to solving a specific problem and the assembly of various elements into a meaningful whole.	Select an appropriate solution for responsive action; revise policy, procedure, or plan; evaluate a solution, case scenario, report, or plan; compare solutions, plans, ideas, or aspects of a problem; evaluate information or a situation; perform multiple calculations to arrive at one answer.

COST OF EXAM

$299 (member price is $199)

REQUIREMENTS TO TAKE THE CCA EXAM

Required:

- High School Diploma or equivalent

Recommended (not required):

- Six (6) months coding experience directly applying codes; OR
- Completion of an AHIMA approved coding program; OR
- Completion of other coding training program to include anatomy and physiology, medical terminology, Basic ICD diagnostic/procedural and Basic CPT coding.

AGE & FELONY RESTRICTIONS

- There are no age requirements as long as the examinee has a high school diploma or equivalent.
- A felony is not a barrier to taking the examination; however, it would be up to the employer's discretion to restrict hiring to non-felons.

Learning Outcomes
There are six (6) domains:

Domain 1 – Clinical Classification Systems (30-34%)
Tasks:
1. Interpret healthcare data for code assignment
2. Incorporate clinical vocabularies and terminologies used in health information systems
3. Abstract pertinent information from medical records
4. Consult reference materials to facilitate code assignment
5. Apply inpatient coding guidelines
6. Apply outpatient coding guidelines
7. Apply physician coding guidelines
8. Assign inpatient codes
9. Assign outpatient codes
10. Assign physician codes
11. Sequence codes according to healthcare setting

Domain 2 – Reimbursement Methodologies (21-25%)
Tasks:
1. Sequence codes for optimal reimbursement
2. Link diagnoses and CPT codes according to payer specific guidelines
3. Assign correct DRG
4. Assign correct APC
5. Evaluate NCCI edits
6. Reconcile NCCI edits
7. Validate medical necessity using LCD and NCD
8. Submit claim forms
9. Communicate with financial departments
10. Evaluate claim denials
11. Respond to claim denials
12. Resubmit denied claim to the payer source
13. Communicate with the physician to clarify documentation

Domain 3 – Health Records and Data Content (13-17%)
Tasks:
1. Retrieve medical records
2. Assemble medical records according to healthcare setting
3. Analyze medical records quantitatively for completeness
4. Analyze medical records qualitatively for deficiencies
5. Perform data abstraction

6. Request patient-specific documentation from other sources (ancillary depts., physician's office, etc.)
7. Retrieve patient information from master patient index
8. Educate providers in regards to health data standards
9. Generate reports for data analysis

Domain 4 – Compliance (12-16%)
Tasks:
1. Identify discrepancies between coded data and supporting documentation
2. Validate that codes assigned by provider or electronic systems are supported by proper documentation
3. Perform ethical coding
4. Clarify documentation through physician query
5. Research latest coding changes
6. Implement latest coding changes
7. Update fee/charge ticket based on latest coding changes
8. Educate providers on compliant coding
9. Assist in preparing the organization for external audits

Domain 5 – Information Technologies (6-10%)
Tasks:
1. Navigate throughout the EHR
2. Utilize encoding and grouping software
3. Utilize practice management and HIM systems
4. Utilize CAC software that automatically assigns codes based on electronic text
5. Validate the codes assigned by CAC software

Domain 6 – Confidentiality & Privacy (6-10%)
Tasks:
1. Ensure patient confidentiality
2. Educate healthcare staff on privacy and confidentiality issues
3. Recognize and report privacy issues/violations
4. Maintain a secure work environment
5. Utilize pass codes
6. Access only minimal necessary documents/information
7. Release patient-specific data to authorized individuals
8. Protect electronic documents through encryption
9. Transfer electronic documents through secure sites
10. Retain confidential records appropriately
11. Destroy confidential records appropriately

Sector: Health Care

MEDICAL CODER (2)

CREDENTIAL

Certified Professional Coder (CPC) (www.aapc.com/certification/)

CPC EXAM

- 150 multiple choice questions.
- 5 hours and 40 minutes in duration.
- Evaluates the physician-practice coder's knowledge of the following:

Musculoskeletal	Male/Female Genital	Radiology	Digestive
Nervous	Endocrine	Medicine	Integumentary
Pathology	Anesthesia	Evaluation and Management	Medical Terminology
Anatomy and Physiology	Mediastinum & Diaphragm	Practice Management	Coding Guidelines
Respiratory	Hemic & Lymphatic	Maternity & Delivery	Urinary
Eye & Ocular Adnexa	Laboratory	HCPCS Level II	ICD-9-CM

MEDICAL CODING CERTIFICATION REQUIREMENTS

- High School graduate or equivalent is required, but a minimum of an associate's degree is strongly recommended prior to training, testing and seeking employment.
- Two years medical coding experience, such as working in a medical environment or clinic.
  - Without proof of work experience, a person passing the exam will be considered a CPC-Apprentice until the experience is earned.

RECOMMENDATIONS

- Prior courses pertaining to anatomy, physiology and medical terminology is beneficial but not required.

AGE & FELONY RESTRICTIONS

- Individuals must be at least 18 years of age.
- Individuals with a criminal record would have trouble securing employment with this certification.

LEARNING OUTCOMES

- Ability to work with numbers, computers, and medical coding and billing software programs.
  - *Example*: Obtain additional information from a physician, medical provider or insurance company for additional information.
- Knowledgeable about the correct application of Current Procedural Terminology (CPT) and correctly interpret/report medical procedures/services.
- Knowledgeable about Healthcare Common Procedure Coding System (HCPCS) Level II procedure and supply codes for durable medical equipment (DME), injections, Medicare services, and other medical supplies.
  - *Examples*: Rules for code usage, tips on code selection, Physician Quality Reporting Indicators (PQRI), various drug brand names, facility coverage and payment indicators to determine if the codes are bundled, covered, or non-covered in facility settings, injection/infusion supplies, and procedures/professional services (temporary codes).
  - *Examples*: Medicare coverage and national pricing for all HCPCS II codes covered under the Medicare Physician Fee Schedule (MPFS), Durable Medical Equipment, Prosthetics/Orthotics & Supplies (DMEPOS) Fee Schedules, clinical lab, and drug average sale price (ASP) fee schedules.

- Knowledgeable about International Classification of Diseases (ICD-9-CM) diagnosis codes used for billing professional medical services.
  - *Examples*: Identifying various diseases, such as infectious and parasitic, endocrine, nutritional, and metabolic, circulatory and respiratory system, injury and poising.
- Ability to review and assign the correct coding for diagnoses, procedures and services on medical claims in physician practices and hospitals to ensure reimbursement from insurance companies.
- Comprehension of national coding guidelines and operative reports.
- Ability to apply billing reimbursement guidelines.
- Identify various services, such as evaluation and management, anesthesia, surgical services, radiology, pathology and medicine.
- Ability to integrate medical coding and reimbursement rule changes into a practice's reimbursement processes.
- Knowledge of anatomy, physiology and medical terminology to correctly code provider diagnosis and services.

Sector: Health Care

Medical Billing and Coding Specialist

CREDENTIAL

Certified Medical Billing and Coding Specialist (CBCS) (http://www.nhanow.com/billing-coding.aspx)

CBCS EXAM

- 150 questions, 1 hr. 45 min. 72% or above is a passing score.

REQUIREMENTS TO TAKE THE CBCS

- Must have high school diploma or its equivalent.
  - Or, proof of working towards equivalent for a 1-year provisional certification.
- Have successfully completed a training program or 1-year of work experience within the field.
  - Must be able to provide written proof of training or work experience and/or documentation of education upon request.

RECOMMENDATIONS

- Prior courses pertaining to anatomy, physiology and medical terminology is beneficial but not required.

AGE & FELONY RESTRICTIONS

- Individuals must be at least 18 years of age.
- Individuals with a criminal record would have trouble securing employment with this certification.

LEARNING OUTCOMES

1. Regulatory Compliance

A. Identify appropriate documentation required for release of patient information.

- *Verify consent forms are signed and contain all relevant information before the services are rendered.*
- *Verify pertinent patient information is released only to authorized individuals.*
- *Compare and contrast informed and implied consent.*
- *Compare and contrast use and disclosure.*

B. Audit billing against medical documentation to prevent fraud and abuse.

- *Verify medical documentation with the codes.*
- *Compare and contrast fraud and abuse.*

C. Identify major laws, regulations, and administrative agencies relevant to medical billing.

- *Adhere to HIPAA, the Stark Law, the Fair Debt Collection Act, and the False Claims Act.*
- *Describe the role of the Office of the Inspector General.*

2. Claims Processing

A. Apply procedures for transmitting claims to third-party payers.

- *Identify causes of claim transmission errors.*
- *Determine the appropriate resubmission method.*
- *Differentiate between primary and secondary insurance plans to initially process crossover claims.*
- *Compare and contrast "clean" and "dirty" claims.*
- *Determine the timely filing limits for claim submission.*
- *Apply knowledge of coordination of benefits.*

B. Apply knowledge of the CMS-1500 form to accurately complete the appropriate fields.
- *Identify appropriate placement of NPI numbers.*
- *Identify appropriate placement of service codes, DX codes, modifiers, and procedures.*
- *Identify appropriate placement of authorization codes.*
- *Identify appropriate placement of primary and secondary insurance.*

3. Front-end Duties

A. Ensure accurate collection of appropriate patient demographic and insurance information.
- *Verify changes to demographic and insurance information.*
- *Determine pertinent documents (e.g., insurance cards, identifications, authorizations, referrals) to collect and update.*

B. Verify insurance eligibility to determine benefits
- *Identify how and where to access insurance verification information.*
- *Apply appropriate patient insurance rules (e.g., birthday rules, coordination of benefits).*

C. Compare and contrast government and private insurance
- *Identify major types of commercial insurance.*
- *Identify the three government insurance plans.*
- *Compare and contrast HMO and PPO plans.*

D. Process appropriate patient authorization and referral forms
- *Determine when a referral is needed.*
- *Compare and contrast preauthorization, precertification, and predetermination.*

E. Prior to the visit, determine appropriate balances due
- *Calculate the patient's balance due.*
- *Verify the copayment, deductible, and co-insurance percentage.*

4. Payment Adjudication

A. Analyze aging report.
- *Identify which accounts need to be worked first according to office protocol.*
- *Identify reasons for an outstanding balance and appropriate follow-up actions.*

B. Post payment accurately
- *Verify patient name, account number, and date of birth prior to posting.*
- *Calculate write-off and adjustment amounts.*

C. Interpret remittance advice to determine financial responsibility of patient and insurance company.
- *Determine patient financial responsibility based on remittance advice.*
- *Analyze the remittance advice to determine accurate assignment of benefits.*

D. Determine reason for insurance company denial
- *Interpret denial codes and denial key codes.*
- *Apply definitions of denial codes and denial key codes to determine appropriate resolution.*

5. Apply Knowledge of Coding

A. Apply specific coding guidelines and conventions for diagnoses and procedures.
- *Identify the correct code to the highest level of specificity using appropriate ICD, CPT and modifiers, and HCPCS codes.*
- *Identify the HCPCS coding convention levels.*
- *Identify the structure of ICD coding manuals.*
- *Identify the sections and organization of the CPT coding manual.*
- *Recognize situations where encounter forms should be reviewed with physicians.*

B. Abstract the medical documentation by applying knowledge of medical terminology and anatomy and physiology.

- *Apply knowledge of medical terminology and acronyms.*
- *Apply knowledge of anatomy and physiology.*

Sector: Health Care

PATIENT ACCESS

CREDENTIAL

National Association of Healthcare Access Management's Certified Healthcare Access Associate (CHAA) (http://www.naham.org/?CHAALanding)

CHAA EXAM

A two-hour, proctored, internet based exam consisting of 115 multiple choice questions.

NOTEWORTHY DETAILS

- Individuals must be at least 18 years of age.
- Individuals with a criminal record will find securing a position within this field to be difficult.

LEARNING OUTCOMES

Pre-Encounter (40%) – *Individuals must know:*

- *Customer Service* - Know relevant practices regarding both internal and external customer service; understand the rights and responsibilities of patients; demonstrate appropriate staff behavior using care and compassion, technical competency, sensitivity to customer needs, and respect for customer privacy.
- *Customer Assessment* – Perform customer assessments identifying any age specific criteria and concerns, patient expectations, clinical concerns and patient needs, financial concerns, and customer literacy and comprehension.
- *Resource Scheduling* - Understand key components of resource scheduling including: availability, scheduling, documentation, communication, scheduling systems applications, and referral services.
- *Pre-Registration* – Be able to use registration systems, complete medical record initiation, collection, store and disseminate patient information, and respect patient needs in regards to confidentiality and security.
- *Patient and Family Education* - Understand the importance of assisting customers with directions, parking, maps, drop-off and pick-up; provide information about assessments using the appropriate materials and methods.
- *Prerequisites* – Communicate and review testing and procedure prerequisites (e.g. blood work, fasting, or stop medication) and service and procedure information with the patient; know and be able to communicate to patients any financial obligations prior to service, regulatory requirements, payment programs, insurance plans or contracts, information systems and/or web sites for payers.
- *Payer Authorization and/or Determination* - Understand the processes for payer authorization and/or determination.
- *Verification of Benefits* - Know procedures and systems used for verifying patient benefits.

Encounter (45%) – *Individuals must know:*

- *Customer Service* - Know relevant practices regarding both internal and external customer service.
- *Patient Check-in, Admission, or Registration* – Accurately identify patients and any special patient needs; know procedures for communicating admissions information, both internally and externally; identify the level of care is appropriate for each patient; know the role of the patient access representative in collecting demographic information, explaining and obtaining consent, forms and signatures, explaining insurance and payment information, completing physical orders, and using medical terminology.
- *Way Finding* - Understand the importance of assisting customers in way finding.
- *Patient Tracking* – Know key responsibilities in locating, transporting and routing patients.
- *Census Management* – Be able to manage patient activity and data across entities and data systems.
- *Customer Information* – Understand HIPAA regulation for compliance on providing information.
- *Departure or Discharge* – Understand procedures for collecting patient portion of payment.

- *Billing* - Capture all data elements necessary for accurate billing.

Future Development (15%) – *Individuals must know:*

- *Data Integrity* - Understand how data is used to measure quality and accuracy; know what data is collected and reported for statistical calculations; understand how to access and use any reporting databases.
- *Resource Management* - Understand key components of the resource management of staff, equipment and supplies.
- *Customer Satisfaction* – Administer customer surveys; understand results for use in quality improvement.
- *Staff Education and Competency* – Know relevant performance indicators for the patient access representative position; understand how performance improvement, staff training and continuing education contribute to the profession.
- *Benchmarking* - Understand the importance of quality of service, productivity and peer group comparisons.

Sector: Health Care

PHARMACY TECHNICIAN

CREDENTIAL

Certified Pharmacy Technician (CPhT) (http://www.nhanow.com/certifications/pharmacy-technician)

EXAM

There are two exams available to become a CPhT:

- The National Health Career Association ExCPT -Consists of a two-hour and ten minute, 120 multiple choice questions exam, which costs $105 and is comprised of three main areas: Regulation and Technician Duties (25% of the exam), Drugs and Drug Products (23%), and The Dispensing Process (52%).
- The Pharmacy Technician Certification Board Exam PTCB-Consists of a two-hour, 90 question multiple-choice exam which costs $129 and covers 9 areas: Pharmacology for Technicians, Pharmacy Law and Regulations, Sterile and Non-Sterile Compounding, Medication Safety, Pharmacy Quality Assurance, Medication Order Entry and Fill Process, Pharmacy Inventory Management, Pharmacy Billing and Reimbursement, and Pharmacy Information System Usage and Application.

REQUIREMENTS

- High school diploma or its equivalent (both ExCPT and PTCB)
- Individuals with a criminal record involving drugs or controlled substances would not be suited for this training (both ExCPT and PTCB).
- Must be 18 and have completed a training course or one year of relevant work experience (ExCPT only).

AGE & FELONY RESTRICTIONS

- Individuals must be at least 18 years of age or have a waiver.
    - No felony conviction or drug or pharmacy related convictions, including misdemeanors.

No denial, suspension, revocation, or restriction of registration or licensure, consent order or other restriction by any State Board of Pharmacy. No admission of misconduct or violation of regulations of any State Board of Pharmacy.

LEARNING OUTCOMES

Assisting the Pharmacist in Service to Patients – *Individuals must know how to:*

- Perform drug administration functions under appropriate supervision.
- Compound a prescription/medication order and provide prescription/medication to patient/patient's representative.
- Determine fees and obtain reimbursement for products and services.
- Discuss payment assistance plans with the patient/patient's representative to ensure the best selection is made.
- Collect and communicate patient-specific data to assist the pharmacist in monitoring patient outcomes.
- Direct patient/patient's representative to pharmacist for counseling.
- Communicate with third-party payers to verify coverage and obtain any necessary prior authorizations.
- Review the order to verify entirety, accuracy, authenticity, and reimbursement eligibility.
- Ensure the medical record/patient profile is complete with pertinent information, such as medication history.
- Maintain data related to restricted-drug distribution programs and investigational drugs and report to the pharmacist.

Maintaining Medication and Inventory Control Systems – *Individuals must know how to:*

- Properly dispose of or destroy pharmaceuticals.
- Keep track of controlled substances and investigational products.
- Repackage finished dosage forms for dispensing, such as oral syringes.
- Locate supplies that need to be ordered, such as pharmaceuticals, durable and non-durable medical equipment.
- Define policies and procedures to deter theft and/or drug diversion.
- Prepare medications in advance for orders and perform quality assurance tests.
- Ensure inventory does not contain any recalled, expired, discontinued, slow moving, or overstocked materials.
- Maintain associated records and participate in quality assurance programs.
- Ensure record-keeping systems are kept for repackaging, non-patient specific compounding, recalls, and returns.

Participating in the Administration and Management of Pharmacy Practice – *Individuals must know how to:*

- Perform and document sanitation, maintenance, and calibration of equipment.
- Coordinate communications throughout the practice setting.
- Utilize automated and point-of-care dispensing technology.
- Assist with the implementation and monitoring of policies and procedures.
- Ensure policies and procedures are in place for infection control.
- Ensure policies/procedures are in place for the handling, disposal, and destruction of pharmaceuticals/supplies.
- Communicate with third-party payers to establish or validate coverage for products and services.
- Partake in quality assurance activities and generate reports.
- Ensure patient information is in accordance with federal regulations.
- Utilize manual or electronic information systems in order to perform job related activities.
- Perform billing and accounting functions for products and services.

Sector: Health Care

PHLEBOTOMY TECHNICIAN (1)

CREDENTIAL

Certified Phlebotomy Technician (CPT) (http://www.nhanow.com/certifications/phlebotomy-technician)

PHLEBOTOMY TECHNICIAN CERTIFICATION EXAM (CPT)

- Consists of 110 scaled-scored questions, must earn a minimum of 390 points to pass, and the exam lasts for 1 hour and 50 minutes.

REQUIREMENTS TO TAKE THE CPT

- Must have high school diploma or its equivalent.
  - Or, proof of working towards equivalent for a 1-year provisional certification.
- Have successfully completed a training program or 1-year of work experience within the field.
  - Training/work experience must include a minimum of 30 successful venipunctures and 10 successful capillary sticks performed on live individuals only.
  - Must be able to provide written proof of training or work experience and/or documentation of education upon request.

AGE & FELONY RESTRICTIONS

- No minimum age requirement.
- Individuals with a criminal record are eligible to take the CPT certification exam.
  - High likelihood employer might not hire an individual with the certification based on their record.

LEARNING OUTCOMES

Patient Preparation – *Individuals must know how to:*

- Explain procedure to patient.
- Determine appropriate site that minimizes patient risk.
- Determine venipuncture site accessibility based on patient's age and condition.
- Apply appropriate antiseptic.

Collection Techniques – *Individuals must know how to:*

- Conduct primary collections by:
  - Demonstrating proper insertion and removal techniques for venipuncture.
  - Performing capillary collection method based on patient age and condition.
  - Performing venipuncture steps in correct order (e.g., evacuated tube system, syringe, winged collection set).

Processing – *Individuals must know how to:*

- Label all specimens.
- Perform quality control for CLIA-waved procedures.
- Transport specimens based on handling requirements
- Explain non-blood, specimen collection procedures to patients
- Handle patient-collected, non-blood specimens.
- Avoid pre-analytical errors when collecting blood specimens.
- Adhere to chain of custody guidelines when required.
- Prepare samples for transportation to a reference.
- Coordinate communication between non-laboratory personnel for processing and collection.
- Use technology to input and retrieve specimen data.
- Report critical values for point of care testing.
- Distribute laboratory results to ordering providers.

Safety and Compliance Considerations – *Individuals must know how to:*

- Adhere to regulations regarding workplace safety and operational standards.
- Adhere to HIPPA regulations regarding Protected Health Information.
- Follow exposure control plans in the event of occupational exposure.
- Follow transmission based precautions.
- Wear personal protective equipment while following standard precautions.
- Sanitize hands to prevent the spread of infections.
- Initiate first aid and CPR when necessary.

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Sector: Health Care

PHLEBOTOMY TECHNICIAN (2)

CREDENTIAL

Phlebotomy Technician (PBT), ASCP (American Society for Clinical Pathology)
(http://www.nhanow.com/certifications/phlebotomy-technician)

EXAM

Minimum score of 400 is required to pass the examination. Certification exam costs $135.

REQUIREMENTS TO TAKE THE CPT

- Must have high school diploma or its equivalent.
  - Or, proof of working towards equivalent for a 1-year provisional certification.
- Have successfully completed a training program or 1-year of work experience within the field.
  - Training/work experience must include a minimum of 30 successful venipunctures and 10 successful capillary sticks performed on live individuals only.
  - Must be able to provide written proof of training or work experience and/or documentation of education upon request.

AGE & FELONY RESTRICTIONS

- No minimum age requirement.
- No restrictions for individuals with a criminal background to take the certification.
  - Individuals with a criminal record will most likely have difficulties securing employment with this certification.

LEARNING OUTCOMES

Circulatory System – *Individuals must know:*

- Structure and function of the circulatory system (Heart and arteries, capillaries, and veins).
- Composition/function of blood (Plasma/serum and cellular elements).
- Terminology.

Specimen Collection – *Individuals must know:*

- Patient identification.
- Patient assessment/preparation.
- Site selection.
- Techniques.
- Common tests and problems.
- Equipment (e.g., tubes/anticoagulant, needles, tourniquet, lancets, syringes).
- Terminology

Specimen Processing and Handling – *Individuals must know:*

- Specimen types/suitability (routine and unusual specimens, neonatal screening, and chain of custody specimens).
- Accessioning.
- Labeling.
- Transport and storage.
- Equipment (e.g., centrifuge).
- Terminology.

Point-of-Care Testing – *Individuals must know:*

- Urinalysis.
- Hemoglobin and hematocrit.
- Coagulations (e.g., PT, ACT, Bleeding Time).

- Basic chemistry (e.g., glucose and electrolytes).
- Terminology.

Non-Blood Specimens (Urine, Stool, etc.) – *Individuals must know:*

- Physiology.
- Patient preparation and collection.
- Processing and handling.
- Terminology.

Laboratory Operations Related to Phlebotomy – *Individuals must know:*

- Quality control techniques and equipment, and quality improvement.
- Interpersonal relations (e.g. age specific communication).
- Professional ethics.
- Regulatory agencies (e.g., OSHA, CLSI, CDC).
- Terminology.

Sector: Health Care

PHLEBOTOMY TECHNICIAN (3)

CREDENTIAL

Certified Phlebotomy Technician CPT-ACA (American Certification Agency for Healthcare Professionals http://phlebotomyscout.com/phlebotomy-certification/#ACA-CPT)

EXAM

Two-hour examination online and phlebotomy clinical. The exam has 200 questions and 75% is considered a passing grade. Certification exam costs $100. Candidates passing the exam will earn the certification for 9-18 months, depending on when the exam was taken. After that time, recertification will be necessary.

REQUIREMENTS TO TAKE THE CPT-ACA

- Must have high school diploma or its equivalent.
- Have successfully completed a training program or 1-year of work experience within the field.
  - Training/work experience must include didactic instruction and a minimum of 100 successful venipunctures and 10 successful skin punctures performed on live individuals only.

Must be able to provide written proof of training or work experience and/or documentation of education

AGE & FELONY RESTRICTIONS

- No minimum age requirement.
- No restrictions for individuals with a criminal background to take the certification.
  - Individuals with a criminal record will most likely have difficulties securing employment with this certification.

LEARNING OUTCOMES

Overview of Phlebotomy Practice

- Learn appropriate medical terminology
- Understand/recognize basic healthcare delivery systems
- Know HIPAA and patient bill of rights

Infection Control

- Demonstrate accepted practices/knowledge in detail of infection control techniques
- Demonstrate accepted practices/knowledge concerning patient and laboratory safety
- Understand OSHA requirements for first aid and personal wellness

Anatomy/Physiology

- Understand basic human physiology and anatomy of body systems
- Know properties of blood and body locations of veins
- Define hemostasis and processes of coagulation and fibrinolysis

Collection Equipment, Additives, Order of Draw

- Understand/select appropriate equipment for needed to collect blood
- Know basic additives and appropriate color codes and why they are used
- Know special precautions used in blood draw and substances that interfere with clinical analysis

Venipuncture/Skin Puncture Procedures, Variables, Complications

- Understand physician requests procedures and patient sample identifications
- List standard operating procedures for venipuncture and skin puncture
- Identify preanlytical errors, possible interfering substances, frequent causes of phlebotomy complications
- Know age specific considerations for patients

Special Blood Collection Procedures

- Understand arterial blood properties, collection techniques, necessary equipment
- Understand importance of specimen collection, transport, preservation
- Define toxicology and forensic toxicology

Specimen Handling and Processing

- Know relevant computer information systems and patient confidentiality
- Know methods for transporting and processing various specimen types

Quality Assurance

- Understand the system, policies and procedures for collecting blood and obtaining blood specimens
- Know the terminology, policies and protocol used in the medicolegal aspect of phlebotomy

Sector: Health Care

STERILE PROCESSING TECHNICIAN (1)

CREDENTIAL

Certified Sterile Processing and Distribution Technician (CSPDT) (Certification Board for Sterile Processing and Distribution (CBSPD) (http://www.iahcsmm.org/certification/certification-preparation.html)

EXAM

The CSPDT certification exam is roughly two hours long and has 125 multiple-choice questions with a minimum score of 70% to pass. The certification exam costs $125 or $128 by credit card. The certification is good for five (5) years at which time candidates must re-certify.

REQUIREMENTS TO TAKE THE CSPDT

In order to take this exam you are required to complete a sterile processing technician training program or have at least 12 months experience as a full time sterile processing tech or 6 months experience in a related allied health as well as performing sterile processing or 12 months in a healthcare product sales or service related to sterile processing.

Must be able to provide written proof of training or work experience and/or documentation of education

AGE & FELONY RESTRICTIONS

- No minimum age requirement.
- No restrictions for individuals with a criminal background to take the certification.
    - Individuals with a criminal record will most likely have difficulties securing employment with this certification.

LEARNING OUTCOMES

1. Roles and Responsibilities (14% of Exam)

- Knowledge of potential workplace hazards (e.g., wet floors, electrical outlets, EtO, fumes, body fluids, microorganisms, sharps, latex allergy, and medical waste).
- Knowledge of ergonomic considerations and body mechanics.
- Knowledge of policies and procedures related to sterile processing functions (e.g., Safety, Infection Control, Disaster, MSDS, incident reports).
- Knowledge of federal, state and local guidelines, standards and regulations (e.g., OSHA, FDA, CDC, EPA).
- Knowledge of professional standards and ethics related to patient and employee confidentiality.
- Knowledge of professional standards related to personal hygiene and dress codes.
- Knowledge of function and work flow/traffic flow of the sterile processing department.
- Knowledge of processes for loaner instrumentation.

2. Life Sciences (9% of Exam)

- Knowledge of microbiology related to cleaning, disinfecting and sterilizing.
- Knowledge of factors in disease transmission and modes of cross transmission (e.g., blood, skin, air).
- Knowledge of types of microorganisms (e.g., bacteria, virus, fungus, prions).
- Knowledge of microbial growth conditions (e.g., temperature, humidity).
- Knowledge of basic anatomy and physiology.
- Knowledge of relationship between instrument type and types of tissue and body structure.
- Knowledge of basic medical terminology.

3. Decontamination and Disinfection (21% of Exam)

- Knowledge of types of chemicals and their uses (e.g., detergents, environmental disinfectants, enzymatics, germicides).
- Knowledge of high level disinfectants and sterilant chemicals (e.g., peracetic acid).
- Knowledge of characteristics of chemicals (e.g., concentration, pH, expiration date, level of disinfection, contact time).
- Knowledge of disposal methods of biohazardous substances, chemicals and medical waste.
- Knowledge of Standard Precautions and Personal Protective Equipment.
- Knowledge of operation of decontamination equipment (e.g., washer/sterilizer, washer/decontaminator, sonic).
- Knowledge of manufacturer's instructions for use of chemicals.
- Knowledge of methods of cleaning, disinfecting and decontaminating instruments, rigid container systems and equipment.
- Knowledge of factors affecting decontamination (e.g., procedures, water procedures, water impurities, opening and disassembling).
- Knowledge of manufacturer's instructions for care and handling of instrumentation during cleaning and disinfection.
- Knowledge of manufacturer's recommendations regarding operation, maintenance, cleaning and troubleshooting of departmental and patient care equipment.
- Knowledge of basic care and handling of instruments and equipment.
- Knowledge of procedures for handling CJD contaminated supplies and equipment.

4. Preparation and Handling (15% of Exam)

- Knowledge of instrument terminology and anatomy (e.g., jaws, shanks, box locks, rings).
- Knowledge of types and functions of instruments (e.g., endoscopic, power, microsurgical, robotic).
- Knowledge of types of instrument construction (e.g., finish, composition).
- Knowledge of basic principles of packaging and set configuration.
- Knowledge of characteristics of packaging materials in relationship to sterilization methods.
- Knowledge of use of rigid container systems.
- Knowledge of inspection and testing procedures for instruments and equipment.
- Knowledge of linen pack and tray construction (e.g., size, shape, density, weight).
- Knowledge of manufacturer's instructions for processing requirements of instruments and equipment.
- Knowledge of use and placement of chemical indicators for trays, packs and rigid containers.
- Knowledge of use of sterility maintenance covers.
- Knowledge of tamper evident seals.

5. Sterilization (20% of Exam)

- Knowledge of types of sterilizers and methods of sterilization (e.g., steam, gas plasma, EtO, dry heat, ozone, vapor phase hydrogen peroxide, etc.)
- Knowledge of sterilization cycles and parameters (e.g., time, temperature, concentration, steam under pressure, humidity).
- Knowledge of operation testing and monitoring of sterilizers.
- Knowledge of purpose, interpretation and documentation of sterilization printouts, charts, biological indicators, chemical indicators and chemical integrators.
- Knowledge of types, uses and documentation of biological and chemical indicators.
- Knowledge of loading and unloading criteria and procedures for all types of sterilization methods.
- Knowledge of documentation procedures for lot number, date and load contents.
- Knowledge of procedures for wet packs (e.g., causes, resolution).
- Knowledge of cleaning procedures for sterilization equipment.
- Knowledge of recall procedures for facility sterilized items.

6. Sterile Storage, Inventory Management and Distribution (11% of Exam)

- Knowledge of recall procedures for outside vendor medical/surgical supplies.
- Knowledge of factors that affect shelf life (e.g., moisture, damage).
- Knowledge of storage requirements and shelving design (e.g., humidity, air exchange, placement).
- Knowledge of stock rotation (e.g., FIFO).
- Knowledge of different types of inventory management.
- Knowledge of distribution systems (e.g., case carts, par level, exchange cart, Just in Time Delivery, automated).
- Knowledge of receiving systems (e.g., corrugated boxes, breakout, and containers).
- Knowledge of procedures for documenting supply and equipment charges.
- Knowledge of procedures for tracking usage of medical/surgical supplies, patient care equipment and specialty carts.

7. Ethics (10% of Exam)

- Knowledge of compliance with regulatory standards, best practices, procedures and/or guidelines that impact on patient, employee or environmental safety; reporting instances of non-compliance.
- Knowledge of professional behavior (e.g., non-compliance with dress code; disruptive behavior; theft; willful damage to equipment/property).

Sector: Health Care

STERILE PROCESSING TECHNICIAN (2)

CREDENTIAL

Certified Registered Central Service Technician (CRCST) (International Association of Healthcare Central Service Material Management (IAHCSMM) http://www.iahcsmm.org/certification/certification-preparation.html)

EXAM

The CSPDT certification exam is roughly two hours long and has 125 multiple-choice questions with a minimum score of 70% to pass. The certification exam costs $125 or $128 by credit card. The certification is good for five (5) years at which time candidates must re-certify.

REQUIREMENTS TO TAKE THE CSPDT

In order to take this exam you are required to complete a sterile processing technician training program or have at least 12 months experience as a full time sterile processing tech or 6 months experience in a related allied health as well as performing sterile processing or 12 months in a healthcare product sales or service related to sterile processing.

Must be able to provide written proof of training or work experience and/or documentation of education

AGE & FELONY RESTRICTIONS

- No minimum age requirement.
- No restrictions for individuals with a criminal background to take the certification.
    - Individuals with a criminal record will most likely have difficulties securing employment with this certification.

LEARNING OUTCOMES

The CRCST Exam Content Outline was created through the 2012 job task analysis and outlines the specific areas of knowledge necessary to perform the duties of a Central Service Technician. The Content Outline also details the percentage weight for each of the seven sections which comprise the CRCST Exam. The higher the percentage weight, the more heavily the questions in that area will affect your overall test score.

1 CLEANING, DECONTAMINATION, AND DISINFECTION [PERCENTAGE WEIGHT: 20%]

A Safety Standards

- OSHA/Blood Borne Pathogens
- Microbiology (e.g. cross contamination, microbial transmission, chain of infection)
- Where to obtain information
- Body Mechanics
- Sharp Safety
- Equipment Operation
- Where to find MSDS
- Location & Operation of eyewash station
- Location & Operation of shower
- Ergonomics (e.g. work-flow)
- Chemical Safety
- Traffic flow
- How to contain, transport, and receive soiled items into decontamination or soiled utility rooms

B Personal Protective Equipment (PPE)

- What PPE to put on
- How to put PPE on
- How to take PPE off
- When to change PPE
- How to dispose of PPE
- Hand-washing

C Temperature & Humidity of the Work Environment

- Standards for temperature
- Standards for humidity
- How to record
- Frequency to record
- What to do if not within the parameters

D Preparing Work Area for Decontamination

- Correct cleaning agent or chemicals for cleaning process
- Supplies Needed (e.g. brush, towels)
- Equipment (e.g. compressed air, water)
- How to mix chemicals following the manufacturer's Instructions For Use (IFU) (e.g. dilution)
- How to check & replenish chemicals in equipment
- How to properly dispose of chemicals
- How to determine the correct chemicals for the equipment

E Quality Tests

- Efficacy testing process for washers
- Efficacy testing process for ultrasonic
- Efficacy testing process for Automated Endoscope Reprocessor (AER) iv Efficacy testing process for cart washer
- Water quality test process
- When to test
- How to interpret tests
- Water pressure
- Location of outlets: on/off, regular, and emergency
- Chemical feed line processes
- How to clean & test spray arms
- How to check manifolds & baskets
- Operator's manual (where to find, how to use)
- How to close equipment doors & proper operation of doors

F Troubleshooting Cleaning Equipment

- Who to call if malfunction or have a question
- How to identify and respond to alarms
- How to clean strainers/drains
- Water pressure
- Location of outlets: on/off, regular, and emergency
- Chemical feed line processes
- How to clean and test spray arms
- How to check manifolds and baskets

- Operator's manual (where to find, how to use)
- How to close equipment doors & proper operation of doors

G Disposable Items from Non-Disposable Items

- Difference between disposable & non-disposable items (e.g. single-use versus re-useable, laparoscopic tips)
- Third-party vendor items (e.g. identification of items to return to third-party vendors
- Disposable & non-disposable linens
- Process of broken & repairable instrumentation
- How to dispose of sharps & non-reprocessed items (e.g. biohazards versus non-regulated trash, sharps container)

H Preparing Items for Decontamination

- How to disassemble instrument
- Manual & mechanical cleaning according to IFU
- Where the IFU is located
- Methods for reducing the risk of Toxic Anterior Segment Syndrome (TASS)
- How to load items into the equipment
- How to clean strainer/drains
- Special precautions for Creutzfeldt-Jacob Disease (CJD) instruments

I Cleaning & Decontaminating Non-Disposable Items

- Location of IFU
- Proper opening & positioning of instruments
- Operation times for processes (e.g. manual & mechanical)
- Operation of light & magnification devices
- When & how to use water & air
- What goes in each sink (e.g. two or three sink method)
- Soak process
- Selection of correct brush & size
- Brush care
- Prevention of aerosols
- Proper loading of equipment

J Selecting Appropriate Disinfectant

- How to mix & test chemicals
- Three levels of Spaulding Classification (e.g. non-critical, semi-critical, critical)
- Documentation of chemical testing
- Disinfectant family (what they do, how to use)

K Disinfecting Instruments & Equipment

- Use of correct disinfectant
- Exposure times
- Rinsing

L Transferring Items to Preparation Area

- Air exchange (e.g. negative pressure, positive pressure)
- How to perform visual check for cleanliness

2 PREPARATION & PACKAGING [PERCENTAGE WEIGHT: 20%]

A Temperature and Humidity of the Work Environment

- Standards for Temperature
- Standards for humidity
- How to record
- Frequency to record
- What to do if not within the parameters

B Preparing Work Area for Packaging

- Supplies needed
- Dress code
- Work area requirements (e.g. cleaning requirements)
- Location of IFUs

C Receiving Items for Preparation

- Item identification (e.g. visual, computerized)
- How to unload equipment
- How to check for cleanliness
- How to sort items (e.g. service, facility, loaner)
- How to accept items through pass-through window

D Inspecting Items for Cleanliness and Functionality

- How to check for cleanliness and functionality
- How to follow the IFU
- Proper testing tools and process for checking functionality of items (e.g. sharpness testing)
- How to assemble, test, and disassemble items according to IFUs
- How to remove and replace unacceptable items
- How to lubricate items according to IFUs

E Selecting Items for Assembly

- How to obtain the appropriate count sheets, peel pack list, tray list (e.g. where to place count sheets)
- How to read and identify items (e.g. books, product number, computers, tape, etching)
- How to cross-reference different instruments
- How to size and measure items
- Visual identification & proper names of common instruments

F Assembling Items for Packaging

- Proper handling procedures
- Instrument protection devices (e.g. tip protectors, foam,
- Proper instrument placement (e.g. facilitate sterilization, protect instruments) v Instrument organizers
- Classes and appropriate use of chemical indicators (e.g. proper placement, intended cycle)
- Weight limits and weight distribution

G Packaging Method

- How to select appropriate packaging method (e.g. size, packaging weight)
- Packaging Method (e.g. flat wrap, peel pack, container)
- Sterilization method/cycle to be used
- External indicators

- Tamper evident seals
- Proper application method of packaging
- Proper wrapping technique

H Labeling Method

- Importance of legible handwriting
- Approved writing instrument
- Placement of labeling and writing (e.g. write on plastic side of peel pouch, write on tapenot wrapper)
- How to identify trays missing items
- Correct tray information
- Technician identification
- Storage destination
- Special information identifiers (e.g. implant, loaners, sterilization methods/cycle)
- Date of sterilization/date of expiration (e.g. event-related versus time)

I Transferring Items to Appropriate Area

- Location of sterilization areas (e.g. low temperature, high temperature)
- Location of staging area
- How to prioritize for rapid turn-around
- How to handle items without damaging (e.g. stacking, rough handling)
- Delivery locations
- Air exchanges (e.g. negative pressure, positive pressure)
- Body mechanics
- Ergonomics
- How to track items (e.g. manual, computer)
- Traffic flow

3 DOCUMENTATION & RECORD MAINTENANCE [PERCENTAGE WEIGHT: 10%]

A Record Maintenance

- Environmental conditions for records storage
- Protocol of time-frame to keep records
- What needs to be kept
- Where kept (on-site, off-site)
- How to retrieve

B Temperature, Humidity, and Corrective Action

- Acceptable temperature humidity ranges for work areas
- Procedure for reporting deficiency

C Quality Test Results

- Ultrasonic systems
- Water quality and temperature
- Bowie Dicks tests (e.g. run as first load of the day, empty load)
- Sterilizer leak tests (e.g. when test should be performed)
- Biological and chemical tests (e.g. lot numbers, running control tests, correct placement of tests, incubation procedure, how to interpret results, recall process in case of undesirable outcomes)
- How to interpret the results of the test
- Take corrective action if test fails

- Washer decontamination process (e.g. frequency, type)
- Cart washer

D High Level Disinfection (HLD) Process
- Safety measures when using HLD
- Proper disposal methods
- Dilution labeling requirements (e.g. concentration, expiration, end of use date)
- Technician information
- Patient information

E Employee Incident Reports
- Hospital reporting policy
- Exposure control plan
- State and federal safety regulations
- Risk management and safety management policies
- Patient tracing procedure (e.g. in event of needle stick, cut)

4 STERILIZATION PROCESS [PERCENTAGE WEIGHT: 20%]

A Temperature and Humidity of the Work Environment
- Standards for temperature
- Standards for humidity
- How to record
- Frequency to record
- What to do if not within the parameters

B Preparing Work Area for Sterilization
- Supplies needed (e.g. printer supplies, test packs, label gun supplies)
- Perform sterilizer component checks according to manufacturer's IFU
- Perform cleaning according to manufacturer's IFU

C Sterilizer Tests
- Leak tests
- Bowie Dick/air removal test according to standard
- Placement of biological test packs for sterilization
- When to perform test (e.g. repair, construction, malfunction, routine)

D Receiving Items for Sterilization
- How to move items from cart to cart
- Proper body mechanics
- Proper handling of item to preserve packaging integrity
- How to access IFUs

E Sterilization Method and Cycle
- Functionality of sterilizer
- How to select and change the cycle
- How to identify appropriate use of external indicators (e.g. sterilization method, placement)
- Sterilization method of items
- Identification of appropriate packaging for the sterilization method

F Pre-Sterilization Package Integrity

- What comprises integrity (e.g. holes, filters, broken locks and seals)
- Filter placement, locks, seals, and external indicators

G Loading Sterilizer

- Metal mass versus load configuration
- Wrapped versus rigid containers and peel pouch
- Biological tests
- Appropriate placement of items

H Operating and Monitoring Sterilization Equipment

- How to replace and dispose of empty cartridges/tanks/ cassettes
- How to select cycle
- Where to place biological or air removal tests
- Temperature requirements for each sterilization method
- How to access IFUs

I Cycle Parameters

- How to interpret printout (e.g. temperature, time, and pressure exposure)
- Sign-off procedures to ensure accountability

J Unloading Sterilizer

- What maintains sterility (e.g. Cooling time, temperature, handling)
- Body mechanics
- Ergonomics
- Traffic flow
- Proper PPE

K Post-Sterilization Package Integrity

- What compromises integrity (e.g. holes, filters, broken locks and seals, moisture)
- Filter placement, locks, seals, and external indicators

L Test Results

- Proper handling and incubation of the biological test
- How to interpret test results

M Potential Process Failures

- How to identify a process failure (e.g. wet packs, color change, failure to meet sterilization parameters)
- Procedure for follow-up after process failure

N Lot Control Number

- How to produce a lot control number
- Where to apply lot control number according to manufacturer's IFU

O Documenting Sterilization Load Contents

- How to identify load contents
- How and where to record (e.g. computer, manual)

P Transferring Sterilized Items to Storage and Distribution

- Location of storage areas
- Location of staging area
- How to prioritize for rapid turn-around
- How to handle items without damaging (e.g. stacking, rough handling)
- Air exchanges (e.g. negative pressure, positive pressure)
- Body mechanics
- Ergonomics
- How to track items (e.g. manual, computer)
- Traffic flow
- Early release of implantable devices

5 CUSTOMER RELATIONS [PERCENTAGE WEIGHT: 10%]

A Customer Requests

- Phone Etiquette
- Active listening (e.g. technique of repeating back to customer "I heard you say")

B Communication

- Decision-making skills
- Communication method (email, face-to-face, phone)
- Medical terminology (e.g. anatomy and physiology, surgical terminology, instrumentation)

C Internal and External Teams

- Troubleshooting task forces
- Types of teams (e.g. quality, cross disciplinary)
- Engagement level (e.g. attendance, follow-through)
- Completion of assignments
- Role on the team (e.g. leader, observer)

D Facility and Procedures

- Where to find policies and procedures
- How to interpret policies and procedures
- Frequency of review Responsibility related to review (e.g. make suggestions, keep current with them)

6 STERILE STORAGE & INVENTORY MANAGEMENT [PERCENTAGE WEIGHT: 10%]

A Temperature and Humidity of the Work Environment

- Standards for temperature
- Standards for humidity
- How to record
- Frequency to record
- What to do if not within the parameters

B Preparing Work Area for Sterile Storage

- Supplies needed
- Dress code
- Work area requirements (e.g. cleaning requirements)
- Location of IFUs

C Ordering Inventory

- The ordering process (e.g. par levels, computerized, manual)
- How to identify the product (e.g., catalog numbers, item number, descriptions)
- Unit of measure (e.g. each, box, package, case)
- How to handle back-orders

D Receiving and Inspecting Inventory

- What compromises integrity (e.g. holes, filters, broken locks and seals, water damage, dust)
- External indicators and expiration dates
- How to match delivery document to what was received (e.g. signing for deliveries)

E Stocking and Rotating Inventory

- Location of supplies
- Shelf life policy (e.g. First In First Out (FIFO), expiration, event-related)
- Process for rotating inventory
- Proper storage requirements
- Proper break-out area (e.g. corrugated cardboard, external shipping containers)

F Distributing Sterile and Non-Sterile Items

- Distribution methods
- Proper handling of items
- Ergonomics
- Body mechanics
- Transport guidelines (e.g. closed cart, bins, dustcovers)

G Monitoring Item Usage

- What system to use (e.g. manual, computerized)
- Identification of items

H Tracking Items Distributed by CSSD

- High dollar items
- Specialty carts
- Critical items
- Vendor-owned items
- How items are tracked (e.g. manual, RFID, computerized)
- When to review MSDS information and how to access and interpret MSDS information

I Disposing Inventory

- How to handle recalled items
- Open/not used single use item
- Damaged items
- Expired items
- Obsolete items
- Recycled items
- Donations of items to others

7 PATIENT CARE EQUIPMENT [PERCENTAGE WEIGHT: 10%]

A Temperature and Humidity of the Work Environment

- Standards for temperature
- Standards for humidity

- How to record
- Frequency to record
- What to do if not within the parameters

B Preparing Work Area for Distribution

- Supplies needed
- Dress code
- Location of IFUs

C Receiving Items for Preparation

- Process for recording and tracking rental equipment
- Item identification (e.g. visual, computerized)
- How to unload equipment
- How to sort items (e.g. type of equipment)

D Inspecting Equipment for Cleanliness and Functionality

- How to check for cleanliness
- How to check for compliance with safety standards (e.g. frayed cords, preventative maintenance date, damage)

E Assembling Equipment for Distribution

- How to assemble equipment for distribution
- How to test equipment per manufacturer's use policy
- How to package equipment
- How to label equipment
- How to access IFUs
- How to access disposable components

F Care and Handling

- What equipment requires charging or battery replacement
- Location and proper storage of equipment
- Environmental requirements for stored equipment (e.g. dry, clean)
- Preventative maintenance dates

G Distributing Equipment

- Process for recording
- Types of equipment maintained in CSSD
- Delivery protocols
- Delivery locations (e.g. OR, ED, Labor and Delivery)

H Tracking Medical Equipment

- Systems used (e.g. manual, computer, RFID, hybrid)
- How to record and track the distribution

I Repair and Safety Inspection

- Process for completing biomedical work order (e.g. manual, computerized)
- How to identify label for safety inspection/preventative maintenance

Sector: Hospitality

Guest Service Gold: Certified Guest Service Professional (CGSP)

CREDENTIAL

Guest Service Gold® is a comprehensive program designed to accomplish the goal of creating guest service-oriented line level employees who know how to engage with their guests to provide memorable guest service. Core components include training, employee certification and property certification and can be implemented by any service oriented business, such as restaurants, transportation companies, attractions, retail outlets, not just lodging properties. It can also be used in academic settings to provide students with a solid foundation in guest service.

The CGSP (Certified Guest Service Professional) is issued by the American Hotel and Lodging Educational Institute, the same organization that issues the START certification.

** The **CGSP training must be combined** with another certification training program to qualify for WorkINdiana. **

CERTIFICATION EXAM

- The Exam consists of 35 questions. Time limit is 60 minutes unless the participant has an individual learning plan with accommodation requirements. The test is paper and pencil.
- To pass, individuals must score 70% or higher. If a qualifying score is not achieved, the participant may schedule a re-test. Certificates will be mailed indicating the participant has mastered the Guest Service materials.
- The certification cost is $35.

AGE & FELONY RESTRICTIONS

- Suggested minimum age is 16.
- Individuals with a criminal record are not disqualified from this training.

LEARNING OUTCOMES

The Guest Service Certification assessment and supervisory observation requires candidates to demonstrate their abilities in the following categories:

Authenticity-Keep It Real

1. Understand the importance of genuinely caring when performing job duties for guests/customers through motivated and honest actions.
    a. Authenticity answers the questions:
        i. Are my behaviors when providing guest service real and sincere? How can I genuinely serve my guests?
        ii. Are my motives honest and based on the service needs of the guest?

Initiative-Make the Effort

1. Take ownership of actions. Set into action the process of finding creative ways to provide exceptional guest service.
    a. Initiative answers the questions:
        i. Do I take ownership of the situation? Did Iu begin to provide exceptional service?
        ii. Am I motivated to look for creative or unique solutions?
        iii. Will I make certain the guest is made "better than whole" by my actions?

Empathy-Use Your Heart

1. Identify guest needs and expectations when performing guest service actions.
    a. Empathy answers the questions:
        i. Do I understand the guest's need/expectation?
        ii. Do I understand the guest's feelings and emotions?
        iii. Can I provide more than the basics to the guest?
        iv. Can I connect with the guest's physical and emotional needs?
        v. Do I feel their need for heartfelt guest service?

Intuition-Read the Need

1. Apply creative problem-solving skills when determining guest services, needs or expectations.
    a. Intuition answers the questions:
        i. Can I take the guest's service to a higher level?
        ii. Do I need to ask probing questions to help me understand the guest's need?
        iii. Do I have an idea that will allow me to far exceed the guest's expectations or needs? Be intuitive?
        iv. Do I have an idea for providing a unique type of guest service that the guest is not expecting but would enjoy?

Delivery-Follow Through

1. Accept personal responsibility for delivering unique levels of guest service.
    a. Delivery answers the questions:
        i. Can I provide outstanding guest service when the guest needs it the most?
        ii. How will I make this service go above and beyond the guest's expectations? Is it worthy of being a story the guest tells later to family and friends?
        iii. What unique, memorable, and legendary experience can I deliver to a guest?

Delight-Provide a Surprise

1. Identify opportunities to delight and surprise guests which will allow you to change guest service experience into legendary guest service.
    a. Delight answers the questions:
        i. Can I delight my guests each and every time we meet?
        ii. How can I take this opportunity to make this guest's stay go above and beyond their expectations? Can I make it an experience worth remembering?
        iii. What simple things can I continue to contribute to make a guest's stay unique and special?

Champion-Be a Guest Hero

1. Accept responsibility for assisting guests dealing with challenging, unusual, or unexpected situations in order to provide the guest service needed.
    a. Champion answers the questions:
        i. Am I setting a standard I can consistently pay forward?
        ii. Am I willing to find unique solutions to unusual situations?
        iii. Am I willing to assist guests in need? Offer legendary help?
        iv. Can I rise to the occasion when my guest needs my knowledge, skills, and job expertise the most?

Guest Service Gold Elements

1. Define the basic gold elements of emotionally engaged guest service.

2. Prepare themselves and their work area to facilitate above and beyond guest/customer service.

3. Develop and implement communication tools for increased effectiveness when providing individual guest service experiences to diverse groups of guests.

4. Apply steps to deliver exceptional quality guest service with each and every guest interaction.

5. Maintain the highest level of service excellence in challenging, emergency, or crisis-level situations.

6. Define the "moment of truth" when guest service can be delivered on the highest level of emotional engagement possible.

7. Apply personal involvement and emotional engagement in the process of providing gold-level guest service.

Sector: Hospitality

S.T.A.R.T. CERTIFICATION

CREDENTIAL

American Hotel & Lodging Educational Institute's START (Skills, Tasks, and Results Training) Certification (http://www.in.gov/dwd/abe/files/OccupationalFlyers/WorkIN_START_Hospitality.pdf)

CERTIFICATION EXAM

- The Exam consists of 50 questions; there is no time limit for completing the exam.
- To pass, individuals must score 70% or higher. If a qualifying score is not achieved the first time, the exam can be retaken. All scores and certificates are mailed to the training instructor.
- Those individual who successfully complete the START curriculum and pass the final exam will receive a voucher waiving the fees for a Hospitality Skills Certification in one of the twelve areas covered in the START curriculum. Certification vouchers can be redeemed once an individual has been hired in a qualifying position in the industry.
- Training lasts 15 weeks and costs $675.

AGE & FELONY RESTRICTIONS

- Suggested minimum age is 16.
- Individuals with a criminal record are not disqualified from this training.

LEARNING OUTCOMES

Unit 1: Hospitality and Careers, Guest Service, Professionalism, Safety and Security – *Individuals must know how to:*

- Understand and describe the functions, organization, operations, diversity, and opportunities available in the following industries: food service industry, private club industry, meetings industry, cruise line industry, spa services
- Describe the effect the lodging and tourism industry has on the U.S. economy
- Describe the advantages and disadvantages to a hospitality career and ways to find a job
- Define guest service, identify the benefits of guest service, identify procedures and techniques lodging employees use in guest service, and explain the importance of guest service to the hospitality industry
- Define what it means to present a professional image in the lodging industry, describe the importance of maintaining a professional image, and identify standards of professional conduct
- Identify workplace skills specific to creating a quality hospitality workplace environment
- Describe safe methods for a variety of employee tasks within the hotel and lodging environment, and identify how OSHA regulations affect lodging properties
- Describe a lodging property's security department and the activities it performs, including standards and documentation processes for maintaining security.
- Identify topics and demonstrate techniques for handling emergencies including disturbances and suspicious people, handling fires, power failures, elevator malfunctions, weather emergencies, medical emergency, civil unrest, and weapons.

Unit 2: Rooms Division – *Individuals must know how to:*

- List departments commonly found in a rooms division and describe the function and responsibilities of each: front office, reservations department, communications department, uniformed service department and housekeeping.

- Identify the stages of the guest cycle, describing what takes place and the role employee's play in each stage of the cycle: Pre-arrival, Arrival, Occupancy, and Departure.
- Explain the roles various Rooms Division employees play in the hospitality industry; describe the tasks, procedures and rules which govern their work: Front Desk Representative, Bell Services Representative, PBX Operator, Reservationist, and Public Space Cleaner.

Unit 3: Food and Beverage Division – *Individuals must know how to:*

- Describe the importance of the food and beverage operation to a hotel's success.
- List the primary departments commonly found in the food and beverage division.
- Explain the role various Food and Beverage Division employees play in the hospitality industry, and describe the tasks, procedures and rules which govern their work: Kitchen Staff, Kitchen Steward, Room Service Attendants, Restaurant Server, Banquet Setup Employee, Banquet Server, and Bus Person.
- Explain the importance of quality food production to a restaurant's success, identify common safety guidelines to follow in a restaurant's kitchen, including OSHA regulations, and explain the security procedures that food and beverage employees follow.

Sector: Information Technology

COMPUTER SUPPORT SPECIALIST (1)

CREDENTIAL

CompTIA A+ certification (http://certification.comptia.org/)
May be combined with another IT certification as long as training remains entry-level and the program length meets WorkINdiana requirements.

COMPT TIA A+ EXAMS

- Individuals must pass the CompTIA A+ Essentials and CompTIA A+ Practical exam to obtain credential.
- The exams consists of 100 questions, are 90 minutes in duration, and measures an individual's technical comprehension regarding computer technology, networking, security components, and knowledge in the lab or the field.

AGE & FELONY RESTRICTIONS

- Individuals must be at least 18 years of age; 13 to 17 year-olds are allowed to test with parental consent.
- Individuals with a criminal record can take the certification exams.

LEARNING OUTCOMES FOR THE COMPTIA A+ ESSENTIALS EXAM

Hardware - *Individuals must know how to:*

- Classify hardware, peripherals, networking, security components, storage devices, and backup media.
- Define power supply types and characteristics, such as AC adapter and Voltage selector switch.
- Install and construct peripherals and input devices, such as the mouse, keyboard and bar code reader.
- Define cooling methods and devices, and evaluate memory types, characteristics, and their function.
- Install and configure laptop components and printers, such as laser and inkjet.
- Explain the function and characteristics of CPUs and their features, such as hyper threading and multi core.
- Define motherboard components, types and features, such as I/O interfaces and memory slots.
- Explain the purpose and types of adapter cards, such as video and multimedia.

Troubleshooting, Repair and Maintenance - *Individuals must know how to:*

- Define widespread laptop issues, and determine troubleshooting methods for laptop issues and tools for printers.
- Define the troubleshooting theory and common hardware/operating system symptoms and their causes.
- Incorporate preventative maintenance techniques, such as disk defragmenter or Scandisk.

Operating Systems and Software - *Individuals must know how to:*

- Install and configure the Windows Operating System (OS) and basics of boot sequences, methods and startup utilities.
- Compare the various Windows Operating Systems as well as demonstrate proper use of user interfaces.

Networking - *Individuals must know how to:*

- Classify network cables and connectors and their implementations as well as compare the diverse network types.
- Identify the basics of networking fundamentals, inclusive of technologies, devices and protocols.

Security - *Individuals must know how to:*
- Define basic principles of security concepts and technologies, such as software firewall and encryption technologies.

Operational Procedure – *Individuals must know how to:*
- Identify appropriate safety and environmental procedure, such as proper disposal procedures.

LEARNING OUTCOMES FOR THE COMPTIA A+ PRACTICAL APPLICATION EXAM

Hardware - *Individuals must know how to:*
- Install, configure, upgrade, and maintain PC workstations, the Windows OS and SOHO networks.
- Utilize troubleshooting techniques and tools to effectively and efficiently resolve PC, OS, and network connectivity, issues and implement security practices.
- Identify problems, troubleshoot and repair personal computer, laptop components, and regular printer problems.

Operating Systems - *Individuals must know how to:*
- Apply system utilities, such as disk defragmenter, and evaluate the results.
- Distinguish between the Windows Operating System directory structures, such as Windows 2000, XP, and *Windows 7*.
- Identify the appropriate commands and options to troubleshoot and resolve problems.

Networking - *Individuals must know how to:*
- Troubleshoot client-side connectivity issues such as proxy settings and install a home office system, such as broadband.

Security - *Individuals must know how to:*
- Avoid, troubleshoot and remove viruses and malware, such as quarantine infected systems and using antivirus software.

Sector: Information Technology

ELECTRONICS TECHNICIAN (1)

CREDENTIAL

Certified Electronics Technician (ISCET), Electronic Systems Associate – Digital Circuits (ESA 4) (http://www.iscet.org/certification/index.html)

The ESA certification is open to anyone interested in electronics, including a technician or student. The ESA covers DC, AC, Semi, and Digital in 4 parts. Certificates are awarded for passing each of the 4 parts. Once all 4 certificates are earned the Associate CET is awarded. The ESA program offers advantages to the student and the instructors that the Associate level CET program does not offer. Students may complete one part, earn a certification and return later to obtain training on another part and earn another certification.

Electronics Systems Associate 4

75 question exam, $85
Certificates are issued for life; earning the other three certificates earns the student the Associate CET Certificate.

OCCUPATIONS

Electrical and Electronic Repairers, Control Technician, Electronics Technician, & Electrical Technician

AGE & FELONY RESTRICTIONS

- No age requirement listed; this could be due to work experience requirements.
- Individuals with a criminal record may qualify for this training.

LEARNING OUTCOMES

I. Basic Digital

A. Basic Concepts

1. Describe the differences in digital and analog systems.
2. Describe parallel and serial transmission.
3. Operate logic probes.
4. Identify and explain a timing diagram.

B. Numbering Systems and Codes

1. Perform decimal to binary conversions and the reverse.
2. Perform hexadecimal to decimal or binary conversions and the reverse.
3. Perform octal to decimal or binary conversions and the reverse.
4. Perform binary addition and subtraction on two binary numbers.

C. Logic Functions and Gates

1. Explain the operation of both exclusive-and exclusive-nor circuits.
2. Describe the operation of and construct the truth tables for the AND, OR, NOT, NAND, and NOR gates.
3. Describe the major characteristics and difference among logic (TTL, MOS, and CMOS) families.
4. Design basic logic circuits with and without the help of a truth table.

II. Combinational Digital

A. Combinational Logic Circuits

1. Identify and describe input and output states of logic gates in various combinations and applications.

B. Flip Flops and Related Devices

1. Draw timing diagrams for the various flip-flop circuits.
2. Describe various triggering methods, edge, positive, negative and their purpose.
3. Describe different applications for clocked, master-slave, toggling and unclocked flip-flops, and R-S.
4. Draw the output timing waveforms of several types of flip-flops in response to a set of input signals.

C. Counters and Registers

1. Explain the operation and describe characteristics of synchronous and asynchronous counters.
2. Explain the operation and characteristics of various types of registers.
3. Explain set, preset, clear functions.

D. Memory Circuits

1. Identify the properties and different types of RAM, ROM, PROM and EPROM.
2. Explain serial, parallel, and parity checking memory transfers.
3. Discuss the need for memory caches.

III. Advanced Digital

A. Introduction to Microprocessors

1. Identify the types of modern processors families.
2. Identify the characteristics of the various families.
3. Identify the minimum circuit connections needed for operation.

B. Introduction to Programmable Logic Devices

1. Identify types and functions of programmable logic devices.

Sector: Information Technology

ELECTRONICS TECHNICIAN (2)

CREDENTIAL

International Society of Certified Electronics Technicians (ISCET)-Certified Electronics Technician (CET) (http://iscet.org/certification/associate.html)

EXAM

This multiple-choice exam covers basic electronics, math, DC and AC circuits, transistors and troubleshooting. In order to pass, students must obtain 75% or higher. The certification earned upon passing the exam is good for four years.

REQUIREMENTS TO TAKE THE EST EXAM

Currently the certification does not have any minimum requirements before sitting for the exam. It is highly recommended that some type of training course should be taken before attempting the certification.

AGE & FELONY RESTRICTIONS

- No age requirement.
- Individuals with a criminal record are eligible for this type of training.

LEARNING OUTCOMES

Electrical Basics – *Individuals must know how to:*

- Identify differences between AC and DC power.
- Identify differences between low-voltage and line voltage
- Identify the four basic units of measurement used with electricity, and be able to explain how they relate in Ohm's Law.

Troubleshooting

- Identify basic troubleshooting strategies and best practices

Transistors and Semiconductors

- Understand how they work, differences, materials, and practical applications

Components and Circuits

- Identify and understand functionality, differences, safety guidelines and practical applications

Instruments

- Know and identify basic relevant tools and devices and their uses

Tests and Measuring

- Must be able to identify and use basic appropriate testing and measuring devices and interpret results

Sector: Information Technology

ELECTRONICS TECHNICIAN (3)

CREDENTIAL

Electronics Systems Professional Alliance (ESPA)-Electronic Systems Technician (EST) (http://iscet.org/certification/associate.html)

EXAM

The exam for EST is 100 questions and requires 70 or more correct answers for a passing score. The exam is a timed test and has a maximum time of two hours.

REQUIREMENTS TO TAKE THE EST EXAM

Currently the certification does not have any minimum requirements before sitting for the exam. It is highly recommended that some type of training course should be taken before attempting the certification.

AGE & FELONY RESTRICTIONS

- No age requirement.
- Individuals with a criminal record are eligible for this type of training.

LEARNING OUTCOMES

Electrical Basics – *Individuals must know how to:*

- Identify differences between AC and DC power.
- Identify differences between low-voltage and line voltage
- Identify the four basic units of measurement used with electricity, and be able to explain how they relate in Ohm's Law.

Tools – *Individuals must know how to:*

- Read and identify planning tools, including construction drawings, symbols on drawings, documentation tools and methods.
- Identify hand tools, power tools, test equipment and their uses, storage and maintenance.

Construction Methods and Materials – *Individuals must know how to:*

- Identify construction methods, and materials.

Wiring and Installation Practices – *Individuals must know how to:*

- Identify wire and cable materials.
- Identify termination types, pin-out configuration, wire preparation and termination techniques, and connection points on cables and equipment.
- Identify color code standards for telephony, speakers, data and video.
- Identify the use of fasteners, anchors and back boxes used to mount cable and other equipment to structures.
- Identify installation techniques and procedures.

Standards, Codes, and Safety Practices – *Individuals must know how to:*

- Identify the concept of industry accepted standards and best practices
- Identify applicable building codes and safety practices.

Sector: Transportation and Logistics

AUTOMOTIVE SERVICE TECHNICIAN

CREDENTIAL

Automotive Service Excellence (ASE) certification (www.ase.com)

- Pass one or more of A1 – A7 tests and possess at least two years of hands-on experience in automotive repair. OR
- Pass the G1 test for the Auto Maintenance and Light Repair Certification and have at least one year of hands-on working experience in auto maintenance and light repair (half may be met by appropriate vocational training) you will be certified in this area. t (http://www.ase.com/Tests/ASE-Certification-Tests/Test-Series.aspx)

AGE & FELONY RESTRICTIONS

- No age requirement listed.
- Individuals with a criminal record are not disqualified from this training.

LEARNING OUTCOMES FOR TEST A1: Engine Repair – *Individuals must know how to:*

- Diagnosis and Repair for Cylinder Head and Valve Train, Engine Block, Lubrication and Cooling Systems, Fuel Electrical, Ignition, as well as Exhaust Systems Inspection and Service.
  - *Examples*: Inspect and replace hydraulic or mechanical lifters/lash adjusters, inspect, test, and replace internal and external engine oil coolers, inspect and restore water pump, fill crankcase with oil, and install engine oil filter.

LEARNING OUTCOMES FOR TEST A2: Automatic Transmission/Transaxle – *Individuals must know how to:*

- Mechanical/Hydraulic and Electronic Systems.
- In-Vehicle and Off-Vehicle Transmission/Transaxle Maintenance and Repair (removal/installation, disassembly/assembly, and friction and reaction units).
  - *Examples:* Disassemble, clean, and inspect transmission case, sub-assemblies, mating surfaces, and thread condition, inspect hydraulic clutch pack assembly, and inspect and replace external seals and gaskets.

LEARNING OUTCOMES FOR TEST A3: Manual Drive Train and Axles – *Individuals must know how to:*

- Diagnosis and Repair for Clutch, Transmission, Transaxle, Drive Shaft/Half Shaft and Universal Joint/Constant Velocity, Rear Axle (including ring and pinion gears, differential case/carrier assembly, limited slip/locking differential, and axle shafts and housing) and Four-Wheel Drive/All-Wheel Drive Component.
  - *Examples:* Diagnose transaxle noise, difficult shirting, jumping out of gear, fluid condition/type, and fluid leakage problems, inspect, service, and replace shaft center support bearings, and inspect/replace rear axle shaft wheel studs.

LEARNING OUTCOMES FOR TEST A4: Suspension and Steering – *Individuals must know how to:*

- Diagnosis and Repair for the following systems: Steering (steering columns, units, and linkage), Suspension (Front and Rear Suspensions), Wheel Alignment, and Wheel and Tire as well as related Suspension and Steering Service.
  - *Examples:* Inspect, adjust, align, and replace power steering pump belt(s), tensioners, and pulleys, inspect and replace rear suspension system coil springs and spring insulators, and rotate tires/wheels and torque fasteners.

LEARNING OUTCOMES FOR TEST A5: Brakes– *Individuals must know how to:*

- Diagnosis and Repair the following systems: Hydraulic (Master Cylinder, Lines and Hoses, Valves and Switches, Bleeding, Flushing, and Leak Testing), Drum and Disc Brake, Power Assist Units, and Electronic Brake Control.
    - *Examples*: Pressure test brake hydraulic system, remove and replace rotor, test the parking brake indicator, light, switch and wiring, and bleed and/or flush the electronic brake control hydraulic system.

LEARNING OUTCOMES TEST A6: Electrical/Electronic Systems – *Individuals must know how to:*

- Diagnosis, Repair, and Service for the following system: General Electrical/Electronic, Battery, Starting, Charging, Lighting (such as Headlights, Taillights, Turn Signals, Hazard Lights, and Back-up Lights) Gauges, Warning Devices, Driver Information, and Horn and Wiper/Washer.
    - *Examples*: Check electrical/electronic circuits with jumper wires, inspect, clean, repair or replace battery cables, inspect and replace intermittent wiper controls, and diagnose the cause of no turn signal and/or hazard lights.

LEARNING OUTCOMES FOR TEST A7: Heating and Air Conditioning – *Individuals must know how to:*

- Diagnosis, Repair, and Service for the following systems: A/C, Refrigeration (Compressor and Clutch, Evaporator, Condenser, and Related Components), Heating and Engine Cooling, Operating and Related Controls (Electrical, Vacuum/Mechanical, Automatic and Semi-Automatic Heating, Ventilating, and A/C Systems) as well as refrigerant Recovery, Recycling, Handling and Retrofit.
    - *Examples*: Diagnose A/C system problems indicated by system pressures and/or temperature readings, inspect, test, adjust, repair, or replace heating, ventilating, and A/C ducts, doors, and outlets.

LEARNING OUTCOMES FOR TEST A8: Engine Performance – *Individuals must know how to:*

- Diagnosis and Repair for the following systems: Ignition, Fuel, Air Induction, And Exhaust, Emissions Control (Positive Crankcase Ventilation, Exhaust Gas Recirculation, Secondary Air Injection and Catalytic Converter, and Evaporative Emissions Controls) as well as Computerized Engine Controls Diagnosis and Repair.
    - *Examples*: Inspect and repair charging circuit components, connectors and wires, and test for exhaust system leaks.

LEARNING OUTCOMES FOR TEST A9: Light Vehicle Diesel Engines – *Individuals must know how to:*

- Diagnose and Repair for the following systems: Lubrication and Cooling, Air Induction and Exhaust, and Fuel.
- Cylinder Head and Valve Train, Engine Block.
    - *Examples:* Diagnose engine problems caused by battery conditions, perform exhaust back pressure and temperature tests, perform air intake system restriction and leakage tests, and remove, inspect and clean cylinder head assembly.

LEARNING OUTCOMES FOR TEST G1: Auto Maintenance and Light Repair – *Individuals must know generally know the areas listed below. For more details please visit:*

http://www.ase.com/MediaLibrary/Images/PDF%20folder/mlr_guide.pdf

- The Auto Maintenance and Light Repair Certification Test (G1) contains 55 scored questions, plus 10 unscored research questions covering knowledge of the skills related to maintenance and light repairs in engine systems, automatic transmission/transaxle, manual drive train and axles, suspension and steering, brakes, electrical, and heating and air conditioning.

Sector: Transportation and Logistics

LABORERS AND MATERIAL MOVERS

CREDENTIAL

- Manufacturing Skills Standards Council (MSSC) - Certified Logistics Associate (CLA) (https://www.gtc.edu/business-workforce-solutions/specialized-programs/certified-logistics-technician)

LOGISTICS ASSESSMENT FOR CLA

- Assessment is available online.
- Contains approximately 80 multiple choice questions.
- Takes approximately 90 to 120 minutes to complete the assessment.

MINIMUM RECOMMENDATIONS

- 8th grade level of math.
- 10th grade level of English.

AGE & FELONY RESTRICTIONS

- The suggested minimum age is 16.
- Individuals with a criminal record are not disqualified from this training.

AREAS OF KNOWLEDGE FOR THE NINE KEY WORK ACTIVITIES

- Global supply chain logistics life cycle.
- Logistics environment.
- Material handling equipment.
- Safety principles.
- Safe material handling and equipment operation.
- Quality control principles.
- Workplace communications.
- Teamwork and workplace behavior to solve problems.
- Using computers.

LEARNING OUTCOMES– *Individuals must:*

- **Demonstrate an understanding of the various roles in the global supply chain logistics life cycle**
  - Demonstrates clear understanding of how the product life cycle affects the company's viability and profitability
  - Exhibits clear understanding of how one's role affects other parts of the product life cycle
  - Understands various transportation options
  - Applies clear understanding of the basic principles of cost effectiveness and productivity enhancements
- **Demonstrate an understanding of the logistics environment**
  - Exhibits clear understanding of security requirements (e.g. CTPAT, FAST, Homeland Security, etc.) applicable to the logistics environment
  - Applies clear understanding of the environmental impact of logistics activities
  - Demonstrates clear understanding of the physical layout of the logistics environment (e.g., warehouse physical layout, etc.)
- **Operate and use equipment**

- Recognizes and understands uses of different types of material handling equipment
- Operates forklifts, tractors, hand trucks and dollies safely
- Operates conveyor systems safely and within operational guidelines
- Operates automated storage systems in a manner that assures efficiency and safety

- **Practice safety principles**
  - Participates in all national, state and local safety training requirements
  - Is aware of, understands and complies with relevant safety standards (such as OSHA, DOT, ANSI, etc.)
  - Maintains a clean and orderly work area
  - Demonstrates emergency procedures to be applied in the event of an incident or accident
  - Demonstrates procedures to be applied to safely stop unsafe processes
- **Practice safety principles in the handling of materials and operation of equipment**
  - Applies safe material handling procedures
  - Demonstrates safe lifting and carrying practices
  - Identifies and complies with safety markings displayed on containers and cargoes
  - Identifies, monitors and reports potential work hazards, out-of-compliance conditions and safety concerns immediately
  - Uses appropriate personal protective equipment
- **Practices quality control principles**
  - Participates in quality control programs and initiatives
  - Explains difference between preventative and corrective maintenance actions
  - Uses established procedures to promptly document and communicate quality problems or issues
  - Participates in quality audit process
  - Presents quality improvement recommendations in a clear and concise manner
- **Employs work communication practices**
  - Facilitates communication between shifts by providing input about completed work, work that remains to be completed and shift problems or issues
  - Communicates appropriate information to both internal (i.e., coworkers, supervisors, management, etc.) and external customers
  - Clearly and effectively communicates thoughts, ideas and information orally and in writing
  - Employs communication practices to solve interpersonal problems
  - Communication reflects a clear understanding and accurate use of logistics nomenclature and terminology
  - Elicits clear statements of customer requirements and specifications
  - Applies appropriate actions for handling internal and external customer complaints
- **Practices teamwork and good workplace behavior to solve problems**
  - Demonstrates ethical and responsible behavior at work through the appropriate: use of company IT systems, handling of tools and equipment, handling of proprietary information, communications with co-workers, management, customers and suppliers
  - Understands and follows company's Code of Conduct
  - Demonstrates an understanding of work requirements and agreements
  - Applies problem solving tools and procedures to identify problems and suggest potential solutions
  - Works in a team environment to solve problems
  - Demonstrates characteristics of an effective team member in a logistics operation

- **Uses relevant computer systems and applications to increase productivity**
    - Demonstrates effective use of computer systems and software applications (i.e., internet browser, e-mail, word processing, spreadsheet, presentation) to fulfill roles and responsibilities
    - Demonstrate an understanding of common software systems (e.g., Order Management System, Warehouse Management System, etc.) used in a logistics operation

Sector: Transportation and Logistics

LABORERS & MATERIALS MOVERS+FORKLIFT DRIVING

CREDENTIAL

Manufacturing Skills Standards Council (MSSC) - Certified Logistics Associate + Forklift (CLA+) (https://www.gtc.edu/business-workforce-solutions/specialized-programs/certified-logistics-technician)

EXAM

Employer conducted training and evaluation for the operation of powered industrial trucks (forklifts) in compliance with OSHA standard 29 CFR 1910.178(l) (1). Employers will certify that each operator has been trained and evaluated in compliance with this standard. The certification must include the name of the operator, the date of the training, the date of the evaluation and the identity of the person(s) performing the training or evaluation.

FORKLIFT CERTIFICATION REQUIREMENTS

Must be at least 18 years of age or older. Trainees may operate a powered industrial truck only under the direct supervision of persons who have the knowledge, training, and experience to train operators and evaluate their competence and where such operation does not endanger the trainee or other employees.

AGE & FELONY RESTRICTIONS

- The minimum age is 18.
- Individuals with a criminal record are not disqualified from this training.

LEARNING OUTCOMES

Powered industrial truck operators shall receive initial training in the following topics, except in topics which the employer can demonstrate are not applicable to safe operation of the truck in the employer's workplace. [29 CFR 1910.178(l) (3)]

Truck-Related Topics – *Individual must:*

- Understand the operating instructions, warnings, and precautions for the types of truck the operator will be authorized to operate.
- Explain the differences between the truck and the automobile.
- Know the location and function of the truck's controls, instrumentation, and engine or motor.
- Be able to steer and maneuver the truck, understanding the importance of visibility, including any visibility restrictions due to loading.
- Know all fork and attachment adaptations, operations, and use limitations.
- Understand vehicle capacity, stability, and operating limitations.
- Know vehicle inspection and maintenance procedures that the operator will be required to perform.
- Understand all procedures for refueling and/or charging and recharging of batteries.

Workplace-Related Topics – *Individual must:*

- Understand all surface conditions where the vehicle will be operated.
- Know the composition of loads to be carried and how this affects load stability.
- Understand the principals and procedures of load manipulation, stacking, and unstacking.
- Understand the impact of any pedestrian traffic in areas where the vehicle will be operated.
- Know the precautions to take in any restricted places where the vehicle will be operated, such as narrow aisles, as well as the precautions to take while operating in any hazardous (classified) locations.

- Be able to locate and adjust operation for any ramps and other sloped surfaces that could affect the vehicle's stability.
- Be aware of the hazards present in closed environments and other areas where insufficient ventilation or poor vehicle maintenance could cause a buildup of carbon monoxide or diesel exhaust.
- Understand and other unique or potentially hazardous environmental conditions in the workplace that could affect safe operation.

Sector: Transportation and Logistics

TRUCK DRIVER (Heavy & Tractor-Trailer)

CREDENTIAL

Class A Commercial Driver's License (CDL-A) (http://www.dmv.org/commercial-drivers/cdl-class-types.php)

- Required to operate "combination" vehicles with a Gross Combination Weight Rating exceeding 26,000 pounds, provided the Gross Vehicle Weight Rating exceeds 10,000 pounds.

REQUIREMENTS

- Possess a valid Indiana driver's license.
- Provide proof of Social Security number or citizenship.
- Pass a physical examination.

AGE & FELONY RESTRICTIONS

- Be at least 21 years of age to possess full license.
- Individuals with a criminal record are not disqualified from this training.
  - Cannot transport hazardous materials.
  - Cannot travel outside of allowed area established by parole or probation.

LEARNING OUTCOMES FOR ACKNOWLEDGEMENT TESTS– *Individuals must:*

In order to obtain a CDL permit, applicants must:

- Understand the importance of safety and why vehicle inspections are necessary.
- Conduct a pre-trip inspection to locate any potential problems that could cause a crash or a breakdown.
  - *Examples*: Look under vehicle for fresh oil or fuel leaks, check engine compartment to gauge the level of power steering and windshield wiper fluid, check the steering wheel or clutch to identify any looseness, sticking, damage or improper settings, conduct walk around inspection to check tires, and ensure the cargo is properly secured.
- Accurately check vehicle during a trip to ensure functionality.
  - *Examples*: Check air pressure, temperature and pressure gauges, as well as mirrors, tires, and cargo.
- Properly control speed and direction of vehicle.
  - *Examples*: Accelerating, steering, shifting gears, stopping, and backing safely.
- Correctly use mirrors to see surroundings through sides and rear of vehicle as well as safely pass vehicles and change lanes.
- Perform safe stopping and driving distance and use appropriate speed on turns/curves.
- Safely maneuver vehicle in various weather/seasonal climates (such as winter or very hot weather), drive at night, or in fog.
- Identify railroad-highway grade crossings (such as passive and active crossing), identify warning signs and devices (pavement markings, flashing red light signs, gates), and successfully stop and cross the tracks.
- Understand and be able to operate Antilock Braking Systems (ABS) and be knowledgeable about skid control and recovery.
- Be educated on hazardous material rules as well as identifying hazardous materials and signage/placards.
- Safely transport cargo by balancing the weight and knowing the legal weight limits.
- Identify the parts of an air brake system and understand how they operate.
  - *Examples*: Air compressor, air storage tanks, brake pedal, Antilock Braking System (ABS).

- Operate combination vehicles (such as tractor-trailers, doubles, or triples) by properly braking, turning, and backing up.
- Perform coupling and uncoupling of tractor-semi trailers.
    - *Examples*: Inspecting/unlocking the fifth wheel, positioning the tractor, backing up slowly and securing the tractor, checking trailer height, connecting/disconnecting air lines and electrical cord to trailer, and ensuring supply of air.

LEARNING OUTCOMES FOR SKILLS TEST – *Individuals must know how to:*

Pre-Trip Inspection

- Perform various inspection techniques identified in Test 1: Learning Outcomes for the Acknowledgement Tests.
    - ***Examples***: Inspect the engine and front of the vehicle, check the air compressor for cracks, loose fibers or signs of wear, perform the air brake and hydraulic brake check, ensure the air/electrical lines are not cracked, chafed or worn, check the exhaust system for cracks, holes or leaks, and ensure that the lug nuts are present and not loose.

LEARNING OUTCOMES FOR BASIC VEHICLE CONTROL– *Individuals must know how to:*

- Perform straight-line backing, which consists of backing the vehicle in a straight line between two rows of cones without touching or crossing over the exercise boundaries.
- Perform offset back/right, which consists of backing into a space that is to the right rear of your vehicle without striking the side or rear boundaries marked by cones.

TRUCK DRIVER (Heavy & Tractor-Trailer) - continued

- Successfully Parallel Park, which consists of driving past a parallel parking space that is on your right and backing into it without crossing the side or rear boundaries marked by cones.

LEARNING OUTCOMES FOR ON-ROAD DRIVING– *Individuals must know how to:*

- Safely drive vehicle in a variety of traffic situations, perform various turns, and drive through intersections.
- Safely drive through urban/rural areas by making regular traffic checks and maintaining a safe driving distance.
- Perform lane changes by using proper signals and checking traffic.
- Properly decelerate at a railroad crossing, stop within the required driving distance, and listen and look in both direction for an approaching train or signals.
- Utilize proper steering, turn signals, clutch, gear, and brake usage.

Sector: Transportation and Logistics

TRUCK DRIVER (Light & Tractor-Trailer)

CREDENTIAL

Class B Commercial Driver's License (CDL-B) (http://www.dmv.org/commercial-drivers/cdl-class-types.php)

- Required to operate any single vehicle with a Gross Vehicle Weight Rating (GVWR) of 26,001 or more pounds or any such vehicle towing a vehicle not in excess of 10,000 pounds GVWR.
- Training lasts 1 to 2 weeks and costs $1,695 to $2,283.

REQUIREMENTS

- Possess a valid Indiana operator's license.
- Provide proof of Social Security number or citizenship.
- Pass a DOT physical examination.
- Pass the knowledge CDL test and obtain a learner's permit (expires after 180 days, and can only be issued three permits within 2-year period).
- Successfully complete a CDL skills test and submit the Skills Test Certificate within 30 days to any BMV license branch.

AGE & FELONY RESTRICTIONS

- Be 18 years of age if transporting goods within state lines.
- Be 21 years of age if transporting people.
- Individuals with a criminal record are not disqualified from this training.
  - Cannot transport hazardous materials.
  - Cannot travel outside of allowed area established by parole or probation.

LEARNING OUTCOMES

TEST 1: General Knowledge – *Individuals must know how to:*

- Understand the importance of safety and why vehicle inspections are necessary.
- Conduct a pre-trip inspection, locating any potential problems or irregularities in the following components and systems: gauges/controls, mirrors and windshields, emergency equipment, tires/wheels/rims, lights, brakes, steering, and suspension; know the steps involved in vehicles inspections during and after a trip.
- Maintain basic vehicle control while accelerating, steering, shifting gears, stopping, and backing safely.
- Understand the importance of seeing when driving a commercial vehicle and identify skills that assist drivers in seeing.
- Identify the procedures for communicating to other drivers any intentions to decelerate, turn, change lanes, pass, stop or park.
- Apply key concepts for controlling vehicle speed, including average perception, reaction, braking, and stopping distances; understand adaptations required to control vehicle speed when encountering adverse conditions and terrains.
- Apply strategies for safely managing the space around the vehicle in various driving situations; know strategies for anticipating and identifying common hazards encountered while driving commercial vehicles.
- Define distracted driving and aggressive driving; explain practices drivers can use to avoid the dangers associate with each.
- Safely operate the vehicle at night and in adverse weather conditions such as fog, winter weather, and hot weather; understand strategies to safely operate the vehicle in mountainous terrain.

- Identify railroad-highway grade crossings, identify warning signs and devices around such crossings, and know how to successfully stop and cross the tracks.
- Identify the skills used by the drivers of commercial vehicles to avoid or safely encounter traffic and vehicle emergencies; know basic accident procedures, with special attention to skills used in fire emergencies.
- Operate Antilock Braking Systems (ABS) and be knowledgeable about skid control and recovery.
- Recognize the affects alcohol and drugs on drivers; strategies for staying alert while driving.
- Follow hazardous material rules as well as identify hazardous materials and signage/placards.
- Follow basic cargo safety rules.
- Utilize the relevant information for any of the following endorsements required to operate the vehicle for testing:
  Tank Vehicle, Passenger Transport, Airbrakes, School Bus, and/or Hazardous Materials

TEST 2: Skills Test – *Individuals must know how to:*

- Conduct a pre-trip inspection, explaining each step of the procedure and the importance of inspecting each part.
- Perform straight-line backing, which consists of backing the vehicle in a straight line between two rows of cones without touching or crossing over the exercise boundaries.
- Perform offset back/right, which consists of backing into a space that is to the right rear of your vehicle without striking the side or rear boundaries marked by cones.
- Successfully Parallel Park, which consists of driving past a parallel parking space that is on your right and backing into it without crossing the side or rear boundaries marked by cones.
- Safely drive vehicle in a variety of traffic situations: urban/rural areas, intersections, railway crossings, and expressways.
- Successfully perform various turns, merges and lane changes; maintain safe speed, driving distances, and lane position; utilize proper steering, turn signals, clutch, gear, and brake usage; accurately identify and explain road signs along the route.